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ABSTRACT

Presented are review questions and exercises for several mathematics topics. The first five sections cover the following major topics of the course: algebra, geometry, logic, probability, and statistics. Each of these five units follows a similar format. Each major topic is broken into several subtopics, with examples for each topic taken from five recent New York Regents Examinations: June 1979, January 1980, June 1980, January 1981, and June 1981. The examples given for all subtopics comprise nearly every question on these five tests. After the examples, worksheets are provided that cover each of the subtopics. A Survey of Student Abilities, designed for distribution during the first days of class, concludes the document. This diagnostic tool should show the teacher which areas students start weak in. The survey form is followed by eleven worksheets which are designed to give the class extra work in the designated weak areas. This document is designed to be most useful when used as a textbook supplement. (MP)

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ED209102

M D M REVIEW GUIDE

COURSE I

mathematics

A CoSer Project of the
Cortland-Madison BOCES

-Summer 1981-

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INTRODUCTION

This booklet was written to be of aid to anyone teaching Course I. It consists of five units (the major topics of Course I): Algebra, Geometry, Logic, Probability and Statistics.

The format for each unit is the same. Each major topic is broken into several subtopics. Examples for each subtopic are given. All these examples are Regents problems. They come from five recent Regents examinations: June, 1979; January, 1980; June, 1980; January, 1981; and June, 1981. The examples given for all the subtopics comprise nearly every question on these five examinations.

After the examples, suggested homework assignments are given for each of the subtopics. Every assignment is on a separate sheet of paper so copies can be made without including another assignment.

This booklet can be very helpful if used in the correct manner. We do not suggest that the order we used to list the topics and subtopics be used as the order to teach this course. We used this order just as a convenience to group our topics.

We suggest that this booklet be used as a supplement to the text book. Teachers may look at this booklet when teaching a certain topic. The booklet will show them what type of problems will be on the Regents examinations and give them extra homework problems to supplement the text book. We feel the booklet can be very useful if used in this manner.

The booklet ends with a Survey of Student Abilities. This is intended to be given to students during the first day or two of class. This will show the teacher which areas the incoming class in weak in. It is followed by eleven 'adventures' which are designed to give the student extra work in the weak areas.

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$\{0\}$ $-3 \leq x \leq 2$ π

$n!$ $A = \frac{1}{2}bh$

$x^2 + y^2 = z^2$ $x^2 \cdot x^3 = x^{10}$

$1, 1, 2, 3, 5, 8, 13, 21, \ldots$

$\sqrt{8} = 2\sqrt{2}$

$r - s = r + (-s)$ $\frac{100}{2} = 2\%$

$7x + 12y = 180$

$-\frac{A}{B} = \frac{A}{-B} = -\frac{A}{B}$

$\sqrt{b^2 - 4ac}$

$\sqrt{2}$ $f(x) = x^2 - 8x + 7$

A. Algebra

Part I Questions

1. Evaluate Expressions

Examples:

If b = -2 and c = 3, find the value of $b^2 + c$.

If x = -3 and y = 2, find the value of $(xy)^2$.

Find the numerical value of the expression c + xy when c = 3, x = 4, and y = -5.

What is the value of $3X^3$ if X = 2?

2. Equations

a) Simple

Examples:

Solve for x: 3x - 5 = 16

Solve for ▪: 3▪ + 9 = 1 - ▪

Solve for x: 4x - 3 = 41

b) Containing parenthesis

Examples:

Solve for x: 3(x + 4) - x = 18

Solve for x: 3(2x - 1) = 21

Solve for c: 3(2 + c) = 12

c) Containing decimals

Examples:

Solve for x: 0.4x + 2 = 12

Solve for x: x - 0.4 = 1.6

Solve for x: 0.2x + 0.3 = 8.1

Solve for x: 0.2x + 6 = 80

Solve for a: 3a + 0.2 = 5

d) Containing Fractions

Examples:

Solve for y: y/3 + 2 = 5

Solve for c: 1/3c + 2 = 4

e) Literal

Examples:

Solve for x in terms of a, b, and c: ax - 6 = c

Solve for x in terms of a, b, and c: ax + b = c

Solve for r in terms of c and π: $c = 2\pi r$

Solve for r in terms of s, π, and h: $s + 2\pi rh$

f) Simultaneous

Examples:

Solve for x: $x + y = 7$

$2x - y = 2$

Solve the following system of equations for x:

$3x + y = 5$

$2x - y = 5$

Solve the following system of equations for y:

$3x + 2y = 7$

$2x - y = 8$

Solve the following system of equations for x:

$x + y = 8$

$x - y = 2$

Solve the following system of equations for x:

$3x + 2y = 10$

$x - 2y + 9$

g) Quadratic

Examples:

The solution set of $x^2 - x - 6 = 0$ is

(1) 1,-6 (2) -3,2 (3) 3,-2 (4) 5,1

Solve for the positive value of x: $x^2 - 81 = 0$.

What is the positive root of the equation $x^2 - 49 = 0$?

What is the positive root of the equation

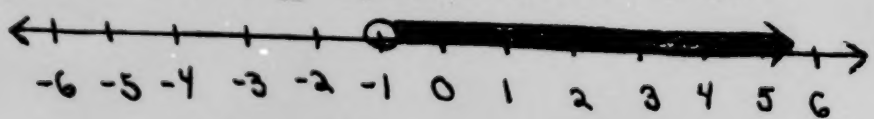
$(x - 4)(x + 3) = 0$?

3. Inequalities

Examples:

What are the numbers in the solution set of $4 \leq x < 7$ if x is an integer? (1) 5,6 (2) 5,6,7 (3) 4,5,6 (4) 4,5,6,7

Which solution set is represented by the graph?



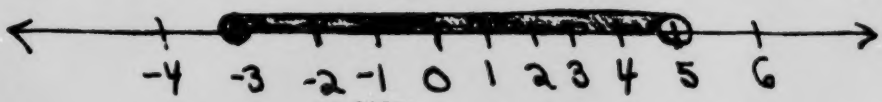
(1) x | $x \geq -1$ (2) x | $x \leq -1$ (3) x | $x < -1$

(4) x | $x > -1$

Which ordered pair is in the solution set of $y = 3x + 2$?

(1) 1,5 (2) 1,6 (3) 5,1 (4) 0,0

The number line shows the solution set of which inequality?



(1) $-3 < x < 5$ (2) $-3 < x \leq 5$ (3) $-3 \leq x < 5$ (4) $-3 \leq x \leq 5$

One member of the solution set of $-5 < x \leq -1$ is:

(1) -1 (2) -5 (3) 3 (4) -6

4. Proportions

Examples:

Solve for h: $\frac{24}{h} = \frac{16}{4}$

Solve for x: $\frac{3}{5} = \frac{9}{x}$

A farmer grew 105 bushels of grain on a 3-acre plot. How many bushels can he expect to grow under the same conditions on a 5-acre plot?

If a car can travel 60 kilometers on 3 liters of gasoline, how many kilometers can it travel under the same conditions on 7 liters?

If 25 pennies weigh 42 grams, find the weight in grams of 75 pennies.

5. Per Cent Problems

Examples:

If 30 students took an examination and 24 passed, what per cent of the students passed the examination?

If 60% of a number is 144, what is the number?

If the sales tax rate is 4%, what is the amount of sales tax which must be paid on a $350 motorcycle?

What is 12.5% of 80?

6. Polynomial Expressions

a) Monomial product or quotient

Examples:

The expression $\frac{-12\,x^6\,y^2}{3\,x^2\,y}$ is equivalent to:

(1) $9\,x^3\,y$ (2) $4\,x^4\,y$ (3) $-4\,x^3\,y$ (4) $-4\,x^4\,y$

The product $(3\,x^2\,y^2)(4\,x\,y^3)$ is equivalent to:

(1) $9\,x^3y^2$ (2) $4\,x^4\,y$ (3) $-4\,x^3\,y$ (4) $-4\,x^4\,y$

The product of $6\,x^3$ and $5\,x^4$ is:

(1) $11\,x^{12}$ (2) $11\,x^7$ (3) $30\,x^{12}$ (4) $30\,x^7$

When $-15\ x^6$ is divided by $-5\ x^3$, the quotient is:

(1) $3\ x^2$ (2) $-3\ x^2$ (3) $3\ x^3$ (4) $-3\ x^3$

b) Polynomial addition and multiplication

Examples:

Express as a trinomial: $(2x + 3)(x - 4)$

Express the product $(x - 3)(x + 3)$ as a binomial.

Find the sum of $3\ x^2 + 2x - 4$ and $2\ x^2 - 3x + 1$.

Express the product $(x + 2)(x - 5)$ as a trinomial.

7. Factoring

Examples:

Factor: $x^2 - 7x$

Factor: $4\ x^2 - 25$

Factor: $x^2 - 11\ x + 24$

Factor: $x^2 - 2x - 3$

Factor: $3x + 6y$

Factor: $a^2 - 4a - 21$

8. Radicals

Examples:

The expression $\sqrt{300}$ is equivalent to:

(1) $50\sqrt{6}$ (2) $12\sqrt{5}$ (3) $3\sqrt{10}$ (4) $10\sqrt{3}$

The expression $\sqrt{90}$ is equivalent to:

(1) $9\sqrt{10}$ (2) $6\sqrt{15}$ (3) $3\sqrt{10}$ (4) $10\sqrt{3}$

The expression $\sqrt{18} - \sqrt{2}$ is equivalent to:

(1) $8\sqrt{2}$ (2) $2\sqrt{2}$ (3) 3 (4) 4

The sum of $\sqrt{18}$ and $15\sqrt{2}$ is:

(1) $18\sqrt{2}$ (2) $24\sqrt{2}$ (3) $15\sqrt{20}$ (4) $16\sqrt{20}$

Which is a rational number?

(1) $\sqrt{6}$ (2) $\sqrt{16}$ (3) $\sqrt{18}$ (4) $\sqrt{24}$

Part II Questions

1. Simultaneous Equations

Examples:

Solve algebraically for x and y and check:

$3x + 2y = 1$

$2x + 3y = 9$

Solve for x and y and check:

$2x + y = -1$

$y = x + 5$

2. Word Problems

a) Consecutive integer

Examples:

Find three consecutive positive odd integers such that the square of the smallest exceeds twice the largest by 7.

The length of one leg of a right triangle is 8. The lengths of the other leg and the hypotenuse are consecutive odd integers. Find the length of the hypotenuse.

b) Number

Examples:

One number is 4 more than another number. If four times the smaller number is decreased by twice the larger number, the result is 12. Find both numbers.

The square of a positive number is 42 more than the number itself. What is the number?

One number is 10 more than another number. If the product of the two numbers is -21, find both numbers.

c) Angle

Examples:

In triangle ABC, angle A is 30° more than angle B. Angle C equals the sum of angle A and angle B. Find the measures of each of the three angles.

In triangle ABC, the measures of angles A and B are in ratio 1:3, angle C is 5 degrees more than angle A. Find the number of degrees in each angle.

d) Perimeter and Area

Examples:

The sides of a rectangle are x and x + 6. The area of the rectangle is 55. Find the lengths of the sides.

The length of a rectangle is twice the length of a side of a square and the width of the rectangle is one less than the side of the square. If the perimeter of the rectangle is eight more than the perimeter of the square, find the length of a side of the square.

A-1-1

Exercises for Evaluating Expressions

If $r = 1$, $s = 2$, $t = -3$, $2 = 10$, $x = -1$ and $y = 0$, then find the value of:

1. $w - rs$ 1. _____

2. $-3s + 5$ 2. _____

3. $(st)^2$ 3. _____

4. $5x^3$ 4. _____

5. $s\,(2 + x)$ 5. _____

6. $4\,(7t + 3y)$ 6. _____

7. $\frac{st + w}{s^2}$ 7. _____

8. $-8r + 7s - 4t$ 8. _____

9. $4\,(2y + 4)(w + t)$ 9. _____

10. $\frac{s^3 - 3r}{x^2 s}$ 10. _____

A-1-1

Exercises for Evaluating Expressions

If A = 1/2, B = -4/5, C = 2/3, D = 2 1/4, then find the value of:

1. $2D + A$ 1. _____

2. $AB + C$ 2. _____

3. $C^2 D - B$ 3. _____

4. $B + D$ 4. _____

5. $BD \div C$ 5. _____

If Q = .3, R = -.01, S = 1.2, T = 1.44, then find the value of:

6. $\frac{Q^2}{R}$ 6. _____

7. $\frac{S}{Q} + R$ 7. _____

8. $\frac{T}{QS} - R$ 8. _____

9. $(T - S)\, Q$ 9. _____

10. QS^2 10. _____

A-1-2a

Exercises for Simple Equations

Solve the following for the variable and check your answer.

1.	$6x - 7 = 11$	1. _____
2.	$3c + 5 + 17$	2. _____
3.	$-8 = 2 + 5B$	3. _____
4.	$-4 - 3B = 11$	4. _____
5.	$3w - 2 - w = 8$	5. _____
6.	$4y - 21 = 9y - 16$	6. _____
7.	$5x - 7 = x + 9$	7. _____
8.	$-9 = -2r + 5r$	8. _____
9.	$7x - 8x = 4 - 2x$	9. _____
10.	$17 - 3A = 15$	10. _____

A-1-2b

Exercises for Equations Containing Parenthesis

Solve the following for the variable and check your answers.

1. $4(x - 2) = 20$ 1. _____

2. $-5(x + 4) = 15$ 2. _____

3. $2(2s + 3) = -18$ 3. _____

4. $8 - 4(y - 1) = -36$ 4. _____

5. $5s + 3(s - 2) - 6s = 12$ 5. _____

6. $3y - (4 - 2y) = 3(y + 2)$ 6. _____

7. $8y + 5(1 - y) + 4y - 6$ 7. _____

8. $(50 - x) - (3x + 2) = 0$ 8. _____

9. $16 - 4(2A + 1) = 6A + (1 - 3A)$ 9. _____

10. $3(-2x + 1) = 4(1 + 3x) + 2$ 10. _____

A-1-2c

Exercises for Equations Containing Decimals

Solve the following for the variable and check your answers.

1.	$0.8 + 6 = 30$	1. _____
2.	$2x - 1.4 = 5.2$	2. _____
3.	$.02y + .17 + .01y + .21$	3. _____
4.	$4A + .2 = 5$	4. _____
5.	$3.6D - 2.4D = 24$	5. _____
6.	$5 - .03x = .7x - .11$	6. _____
7.	$.3x + 2.91 = 5 - .2\ (3 - .01x)$	7. _____
8.	$.1\ (2 - 7x) = 7.1 - 3x$	8. _____
9.	$.05N + .10\ (14 - N) = .85$	9. _____
10.	$13.50 - .35\ (30 - K) = .50K$	10. _____

A-1-2d

Exercises for Equations Containing Fractions

Solve the following for the variable and check your answers.

1. $\frac{x}{2} - 4 = 23$ 1. _____

2. $\frac{1}{2}x + 3 = 9$ 2. _____

3. $\frac{x}{2} - 2 = 5 + \frac{x}{3}$ 3. _____

4. $\frac{1}{4}Q + 3 = \frac{3}{4}$ 4. _____

5. $\frac{2}{3}D + 1 = \frac{1}{2}$ 5. _____

6. $\frac{y}{2} - 1 = \frac{1}{4}$ 6. _____

7. $\frac{1}{3}(3z - 3) = 3$ 7. _____

8. $\frac{2B}{3} - 5 = 1$ 8. _____

9. $\frac{5}{8}x + 3 = \frac{3}{8}x + 6$ 9. _____

10. $\frac{x}{4} - .7 = .3$ 10. _____

1-2e

Exercises for Literal Equations

Solve for x in terms of the other variables in problems 1-6.

1. $Ax = 2$ 1. _____

2. $x + 3A = 0$ 2. _____

3. $5 = x - 3C$ 3. _____

4. $4A = 3x + 2B$ 4. _____

5. $5A + 2Bx = 3D$ 5. _____

6. $6x - 6A = 2x + 10A$ 6. _____

Solve for s.

7. $p = 4s + B$ 7. _____

Solve for R.

8. $C = 2\pi R$ 8. _____

Solve for F.

9. $C = \frac{1}{3}FD^2$ 9. _____

Solve for D.

10. $A = \frac{B + C + 0}{3}$ 10. _____

A-1-2f

Exercises of Simulatneous Equations

Solve the following systems of equations for x and y and check your answers.

1. $x + 3y = 13$
   $-x + y = 7$

   1. x = _____
      y = _____

2. $3x - 2y = 2$
   $5x + 2y = 14$

   2. x = _____
      y = _____

3. $-2x + 5y = -3$
   $2x + 3y = 11$

   3. x = _____
      y = _____

4. $y = 2x + 4$
   $x = y - 5$

   4. x = _____
      y = _____

5. $x + y = 6$
   $y = x - 4$

   5. x = _____
      y = _____

6. $x + y + 2 = 0$
   $x = y - 8$

   6. x = _____
      y = _____

7. $3x + 2y = 8$
   $2x + 5y = 9$

   7. x = _____
      y = _____

8. $3x = 5y = 1$
   $2x + 10y = 14$

   8. x = _____
      y = _____

9. $5x - 3y = 2$
   $4x + 2y = 6$

   9. x = _____
      y = _____

10. $7x + 2y = 9$
    $3x + 8y = 11$

    10. x = _____
        y = _____

A-1-2g

Exercises for Quadratic Equations

Find the solution set for the variable in each equation and check your answers.

1. $(t - 5)(t - 10) = 0$ 1. _____

2. $3(u - 3)(u - 5) = 0$ 2. _____

3. $S(S-2)(S - 4) = 0$ 3. _____

4. $X^2 - 36 = 0$ 4. _____

5. $A^2 - 100 = 0$ 5. _____

6. $16B^2 - 25 = 0$ 6. _____

7. $L^2 + 2L - 8 = 0$ 7. _____

8. $2R^2 - 5R + 2 = 0$ 8. _____

9. $3X^2 - 8X + 4 = 0$ 9. _____

10. $y^3 - 6y^2 + 9y = 0$ 10. _____

11. $4U^2 = 8U + 5$ 11. _____

12. $96 - 20Z + Z^2 = 45$ 12. _____

A-1-3

Exercises for Inequalities

Solve the inequality for the variable and graph the solution set on a number line for 1-6.

1. $2 + 5x > -8$ 1. _____ ←——→

2. $-17 \leq 9y - 8$ 2. _____ ←——→

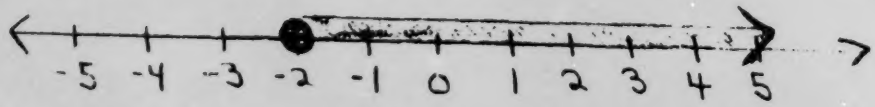
3. $5y + 8 < -4 + 17y$ 3. _____ ←——→

4. $8 - 3y \leq -4y + 7$ 4. _____ ←——→

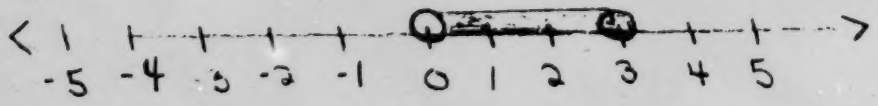
5. $4g + 3 > 9g - 17$ 5. _____ ←——→

6. $10A + 3 \geq 91 - 5A$ 6. _____ ←——→

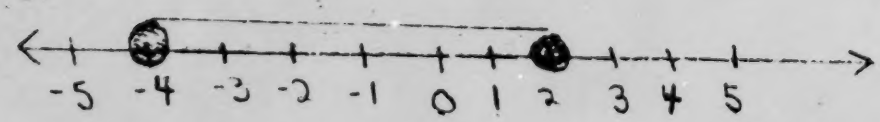
Write the inequality in terms of any variable from the graph in 7-10.

7. 

7. _____

8. 

8. _____

9. 

9. _____

10.

10. _____

A-1-4

Exercises for Proportion Problems

Solve for the variable in 1-6 and check your answers.

1. $\frac{x}{8} = \frac{5}{4}$ 1. _____

2. $\frac{5}{H} = \frac{15}{24}$ 2. _____

3. $\frac{4R}{7} = \frac{12}{3}$ 3. _____

4. $\frac{A + 3}{5} = \frac{14}{10}$ 4. _____

5. $\frac{3x + 2}{2x - 5} = \frac{14}{3}$ 5. _____

6. $\frac{x}{3} = \frac{2}{5}$ 6. _____

7. A man spends $14.76 for 3 shirts. How much will 8 shirts cost at the same rate? 7. _____

8. A car uses 10 gallons of gasoline to travel 135 miles. How much gas will it use for a trip of 945 miles? 8. _____

9. Four out of five freshmen study Course I. How many study Course I in a freshman class of 400? 9. _____

10. A recipe calls for 1 1/4 cups of sugar in baking a 3 pound cake. How many cups of sugar are needed in baking a 5 pound cake. 10. _____

A-1-5

Exercises for Percent Problems

1. On a test taken by 40 students, 95% of the students passed. How many students passed? 1. _____

2. A hotel has 350 rooms. One night 252 were occupied. What per cent of the rooms were occupied that night? 2. _____

3. What is 15% of 640? 3. _____

4. 8 is what percent of 14? 4. _____

5. A class has 20 girls and 15 boys. What per cent of the class is boys? 5. _____

6. At a basketball game, one team took 120 shots and scored 54 goals. What per cent of its shots were successful? 6. _____

7. A merchant sells a camera for $250. Find the cost if the profit is 25% of the cost. 7. _____

8. If the sales tax is 7% and you paid $84 in taxes on a used car, how much did the car cost before taxes? 8. _____

A-1-6a

Exercises for Monomial Expressions

Write the product in 1-10.

1. $(3A^2)(4A^6)$ 1. _____
2. $(2M^5)(3M^6)$ 2. _____
3. $(-6B^5)(-2B^7)$ 3. _____
4. $(3A^3B^2)(4A^2B^4)$ 4. _____
5. $(-2AZ)(AB)$ 5. _____
6. $(A^2)^3$ 6. _____
7. $(5A^5)^3$ 7. _____
8. $(3A^2X^3)^2$ 8. _____
9. $(-3y)^3$ 9. _____
10. $(4Z)^0(2Z^2)^3$ 10. _____

Write the quotient in 11-20.

11. $\frac{28B^6}{4B^2}$ 11. _____
12. $\frac{36\ xy^2}{-4\ x^2\ y^2}$ 12. _____
13. $\frac{-32A^2B^4}{-8A\ B^3}$ 13. _____
14. $\frac{3H^3K^2}{9\ H^5K}$ 14. _____
15. $\frac{13\ C^9D^{10}}{-26\ C^9D}$ 15. _____
16. $\frac{x^3y^2}{2\ x^2y^2}$ 16. _____
17. $\frac{-15\ R^4S^3}{12\ R^2S}$ 17. _____
18. $\frac{4X^2Y}{XY}$ 18. _____
19. $\frac{-75\ C\ D^2}{-15\ C^2D^3}$ 19. _____
20. $\frac{120\ xy^5}{8y^4}$ 20. _____

A-1-6b

Exercises for Polynomial Expressions

Perform the indicated operation and simplify.

1. $(X^2 - 2X + 1) + (X^2 + X - 3)$ 1. _____

2. $(3A^2 - 2A + 4) - (A^2 + 2A - 3)$ 2. _____

3. $(2A^2 - AB + B^2) + (3A^2 + 5A - 7B^2)$ 3. _____

4. $(2X - 1)(2X + 1)$ 4. _____

5. $(2K - 6)(K - 5)$ 5. _____

6. $(7A^2 + 8A - 3) - (A^2 - 2A)$ 6. _____

7. $(3X + 2)(X + 1)$ 7. _____

8. $(2y + 4)^2$ 8. _____

9. $(X + 3)(X - 7)$ 9. _____

10. $(B^2 + 2B + 4) + (-3B^2 - 2B - 7)$ 10. _____

A-1-7

Exercises for Factoring

Factor as much as possible.

1. $A^2 - 8A + 15$ 1. _____

2. $W^2 - 9W - 36$ 2. _____

3. $3X^2 + 14X + 15$ 3. _____

4. $S^2 + 14S + 49$ 4. _____

5. $4N^2 + 12N + 9$ 5. _____

6. $7X^2 + 14XY + 7Y^2$ 6. _____

7. $y^2 + 81 - 18y$ 7. _____

8. $25A^2 - 1$ 8. _____

9. $A^3 + 4A^2 - 5A$ 9. _____

10. $4N^4 + 3AN^3 - A^2N^2$ 10. _____

11. $5Z^2 + 2Z - 3$ 11. _____

12. $8U^2 - 22U + 15$ 12. _____

A-1-8

Exercises for Radicals

Simplify for 1-6.

1. $\sqrt{75}$ 1. _____

2. $\sqrt{99}$ 2. _____

3. $\sqrt{96}$ 3. _____

4. $\sqrt{48}$ 4. _____

5. $\sqrt{\frac{16}{25}}$ 5. _____

6. $\sqrt{18A^9}$ 6. _____

Combine the following for 7-10.

7. $\sqrt{32} - \sqrt{8}$ 7. _____

8. $3\sqrt{5} + \sqrt{20}$ 8. _____

9. $\sqrt{27} + 2\sqrt{12}$ 9. _____

10. $3\sqrt{45} - 3\sqrt{20} + 6\sqrt{80}$ 10. _____

A-2-1

Exercises for Simultaneous Equations

Solve algebraically for the two variables and check your answers. Write your answer as an ordered pair.

1. $y = 2x + 7$
   $5x + y = 28$
   1. _____

2. $4y = 5x - 7$
   $5x + 8y = 31$
   2. _____

3. $x - 4y = 5$
   $2x = -4y - 2$
   3. _____

4. $5x + 7y = 11$
   $3x - 5y = -21$
   4. _____

5. $8A + 3B = 17$
   $6A + 5B = 32$
   5. _____

A-2-2a

Exercises for Consecutive Integer Word Problems.

1. Three times the second of two consecutive even integers, increased by twice the first is 46. Find the integers.

2. Find four consecutive integers such that the sum of the first three exceeds twice the last by 4.

3. Find two consecutive odd integers such that the square of the second decreased by the first is 44.

4. The length and the width of a rectangle are consecutive integers. The area of the rectangle is 56. Find the length and width.

5. The ages of three children are consecutive odd integers. If twice the sum of the two younger children's age is the same as the older child's age increased by 15, how old are the three children?

A-2-2b

Exercises for Number Word Problems.

1. Two less than 2 times a number is the same as the number decreased by 38. Find the number.

2. Twice the sum of 6 and a number is the same as 15 decreased by the number. Find the number.

3. One number is 5 more than another number. The product of the two numbers is 66. Find the number.

4. The square of a positive number is 24 more than 5 times the number. Find the number.

5. The second of 3 positive numbers is 3 more than the first. The third number is 5 less than twice the first. The product of the second and third numbers is five more than the square of the first number. Find the 3 numbers.

A-2-2c

Exercises for Angle Word Problems.

1. In a triangle, the measure of the largest angle is twice the measure of the smallest angle. The measure of the third angle of the triangle is 20^{o} greater than the measure of the smallest angle. Find the measures of the three angles.

2. An angle measures 15^{o} more than twice its complement. Find the measure of each angle.

3. In an isosceles triangle, the measure of the vertex angle is 60^{o} more than the measure of a base angle. Find the measure of the angles of the triangle.

4. In a right triangle, the measure of one acute angle is 4 times the measure of the other acute angle. Find the measures of the two acute angles of the triangle.

5. Twice the complement of an angle is equal to the supplement of the angle less 15. Find the measure of the angle.

A-2-2d

Exercises for Perimeter and Area Word Problems.

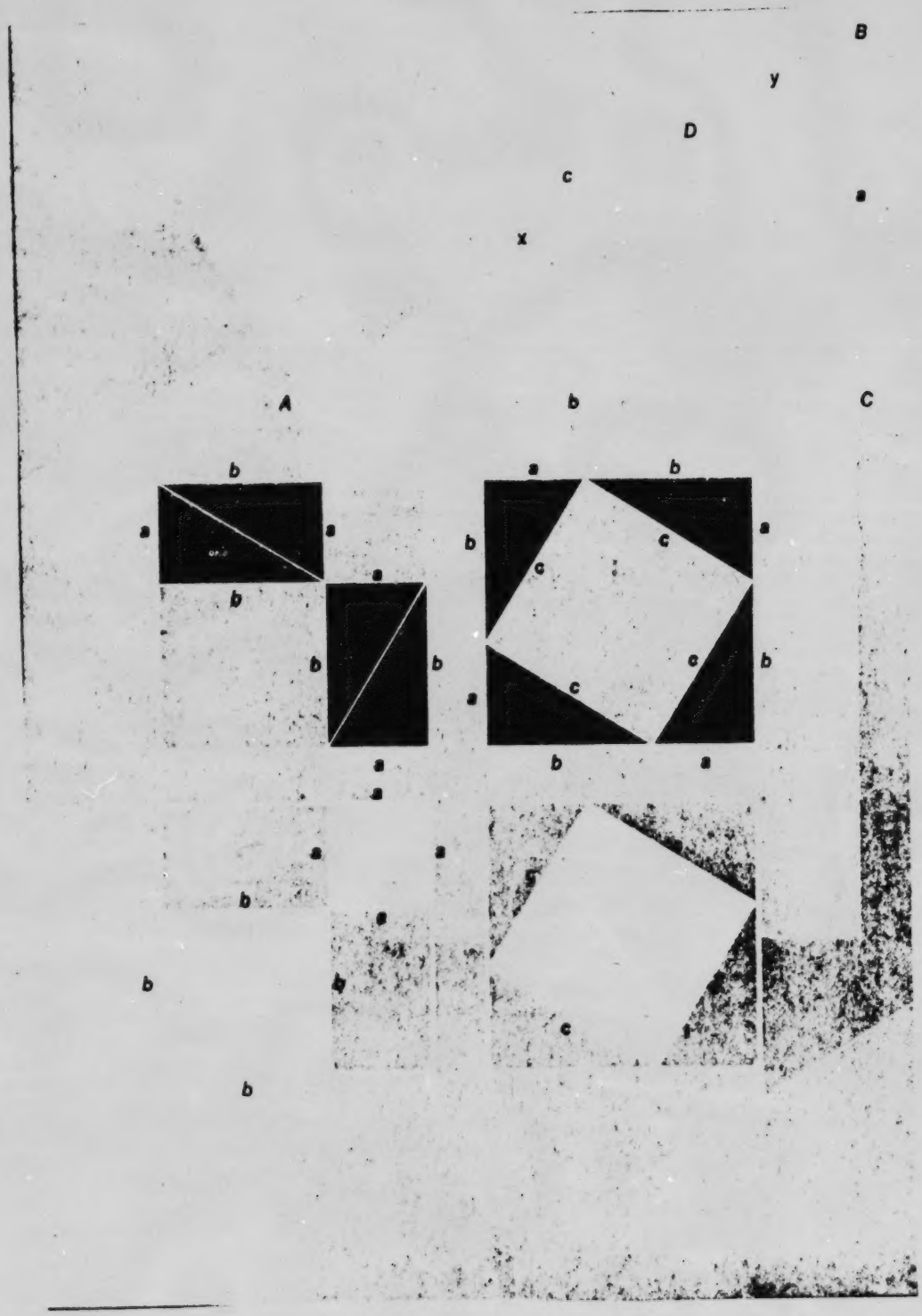
1. The perimeter of a triangle is 38 cm. The first side is 3 cm less than the second, and the third is 5 cm more than the second. Find the lengths of the three sides.

2. The length of a rectangle is twice its width. If the length is increased by 4 inches and the width is decreased by 1 inch, the new perimeter will be 198 inches. Find the dimensions of the orignial rectangle.

3. One side of a square exceeds one side of an equilateral triangle by 6. The perimeter of the square exceeds the perimeter of the triangle by 34. Find the length of one side of the triangle and of one side of the square.

4. The screen of a model 610 TV set is a rectangle, 10 cm wider than it is high. Model 702 has a screen which is 2 cm wider and 3 cm higher and has 240 sq. cm more area. Find the dimensions of the model 610's screen.

5. A rectangular picture is 3 times as wide as it is tall. When it is in a frame 10 cm wide, the total area is 3600 sq. cm more than the area of the picture itself. Find the dimensions of the picture.


B
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a
a
a
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b
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b
c
b

G. Geometry

Part I Questions

1. Triangles

a) sum of angles, complementary angles, supplementary angles

Examples:

If two angles of a triangle measure 30° and 70°, what is the number of degrees of the third angle of the triangle?

If two angles of a triangle are complementary, find the number of degrees in the third angle.

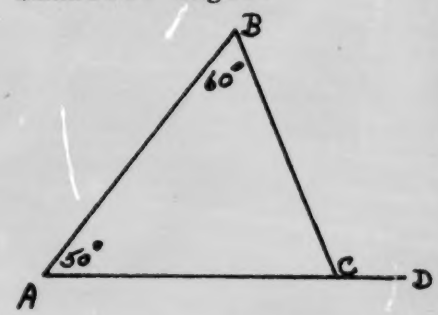
If one base angle of an isosceles triangle measures 35°, find the measure of the vertex angle of the triangle.

Two complementary angles are in the ratio 4:5. What is the measure in degrees of the smaller angle?

(1) 10 (2) 40 (3) 50 (4) 80

If the three angles of a triangle are in the ratio 1:3:5, find the number of degrees in the smallest angle.

In the accompanying figure, $\angle BCD$ is an exterior angle to $\triangle ABC$ at vertex C. If $m\angle A=50$ and $m\angle B=60$, find the number of degrees in the measure of $\angle BCD$.



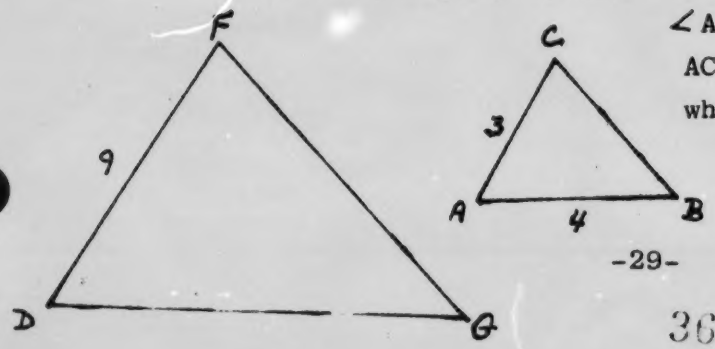
Two angles of a triangle are equal in measure and the measure of the third angle is 150°. Find the number of degrees in one of the two equal angles.

2. Similar

Examples:

A person 5 feet tall casts a shadow of 12 feet at the same time that a tree casts a shadow of 60 feet. Find the number of feet in the height of the tree.

In the accompanying diagram of triangles ABC and DFG, $\angle A \cong \angle D$ and $\angle B \cong \angle G$. If AC = 3, AB = 4, and DF = 9, what is the length of $\overline{DG}$?

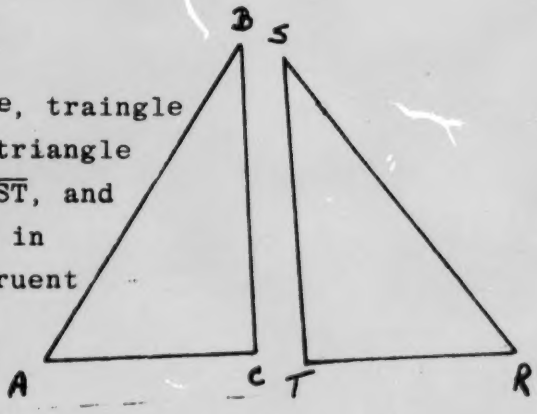


The lengths of the sides of $\triangle ABC$ are 5, 6, and 7. Triangle RST is similar to $\triangle ABC$. The longest side of $\triangle RST$ is 21. Find the length of the shortest side of $\triangle RST$.

c) Congruent

Examples:

In the accompanying figure, traingle ABC is congruent to triangle RST, $\overline{AB} \cong \overline{RS}$, $\overline{BC} \cong \overline{ST}$, and $\overline{AC} \cong \overline{RT}$. What angle in triangle RST is congruent to $\angle BAC$?



2. Pythagorean Theorem

Examples:

The length of the hypotenuse of a right triangle is 8 and the length of one leg is 5. The length of the other leg is:

(1) $\sqrt{39}$ (2) $\sqrt{89}$ (3) $\sqrt{3}$ (4) $\sqrt{13}$

The length and width of a rectangle are 15 and 8, respectively. Find the length of a diagonal.

The length of a rectangle is 8 cm and its width is 6 cm. Find the number of cm in the length of the diagonal.

The lengths of two legs of a right triangle are 5 and 12. Find the length of the hypotenuse.

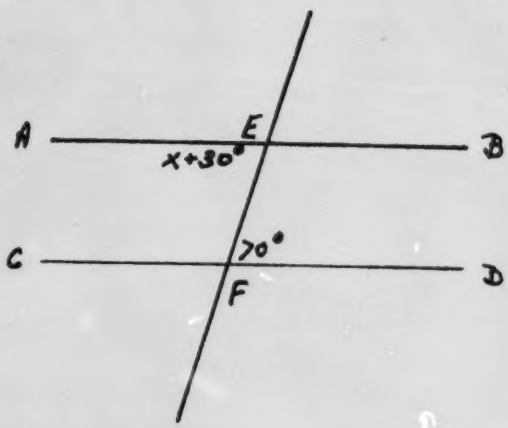
If the length of the hypotenuse of a right triangle is 13 and the length of one leg is 12, find the length of the other leg.

3. Angles

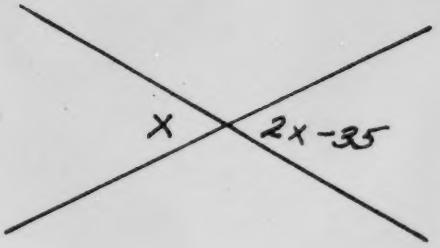
a) alternate interior, alternate exterior, corresponding, vertical

Examples:

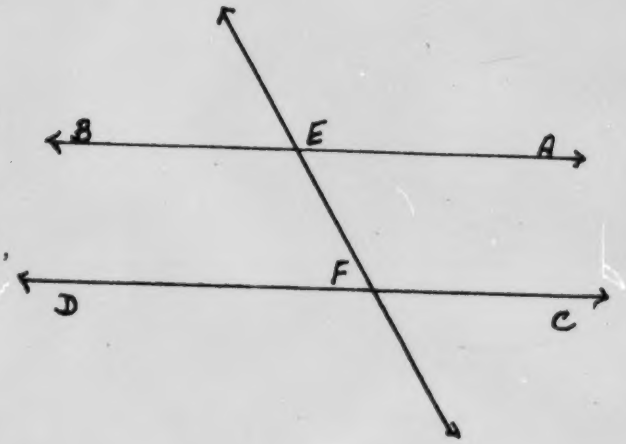
As shown in the accompanying figure, $\overleftrightarrow{AB}$ is parallel to $\overleftrightarrow{CD}$, and $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$ are cut by transversal $\overleftrightarrow{EF}$ at E and F, respectively. If the measure of $\angle AEF$ equals $x + 30^\circ$, and the measure of $\angle DEF$ equals 70°, find x.



As shown in the accompanying figure, verticle angles have degree measures of x and 2x - 35. Find x.



In the accompanying figure, $\overline{AB}$ is parallel to $\overline{CD}$ and these lines are cut by the transversal $\overline{EF}$ at points E and F, respectively. If the measure of $\angle AEF$ is 70°, find the number of degrees in the measure of $\angle DFE$.



4. Graphing

a) slope, y-intercept

Examples:

What is the slope of the graph of $y = 2x + 3$?

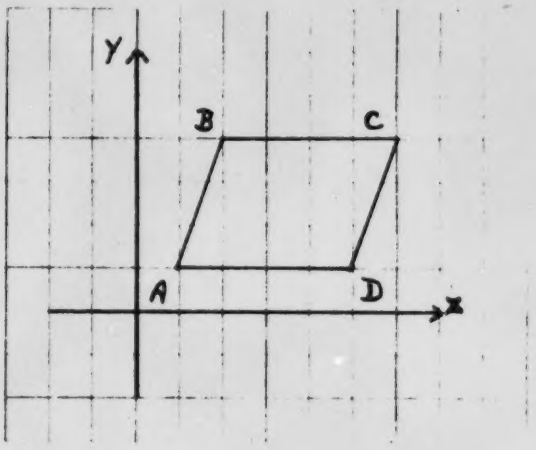
Parallelogram ABCD is shown in the accompanying figure. Which must be true?

(1) slope of $\overline{AB}$ = slope of $\overline{BC}$

(2) slope of $\overline{AB}$ = slope of $\overline{DC}$

(3) slope of $\overline{AB}$ = slope of $\overline{AD}$

(4) slope of $\overline{DC}$ = slope of $\overline{AD}$



The graph of which equation has a slope of 3 and a y-intercept of -2?

(1) $y = 3x - 2$ (2) $y = 3x + 2$ (3) $y = 2x - 3$ (4) $y = 2x + 3$

What is the slope of the line whose equation is $y = 3x - 7$?

(1) -7 (2) -3 (3) 3 (4) 7

The y-intercept of the graph of $y = \frac{2}{3}x + \frac{8}{3}$ is

(1) $\frac{3}{2}$ (2) 8 (3) $\frac{2}{3}$ (4) $\frac{8}{3}$

An equation whose graph is parallel to the graph of $y = -3x + 4$ is (1) $y = 4x - 3$ (2) $y = 3x - 4$ (3) $y = -3x + 4$ (4) $y = -4$

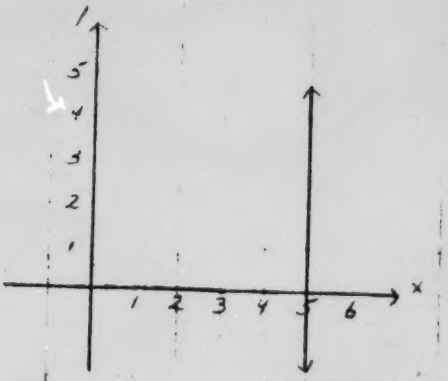
b) identify vertical lines on coordinate axis

Examples:

The graph of which equation is shown on the accompanying diagram?

(1) x = 5 (2) y = 5

(3) y = 5x (4) y = x + 5



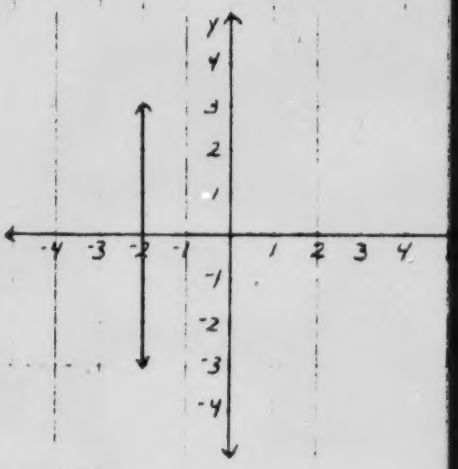
In the accompanying diagram, the vertical line that intersects the x-axis at -2 is the graph of which equation?

(1) x = -2

(2) y = -2

(3) y = x - 2

(4) x + y = -2



c) point on a line

Examples:

Which point lies on the graph of 2x + y = 10?

(1) 0,8 (2) 10,0 (3) 3,4 (4) 4,3

Which pair of numbers represent a point that does not lie on the graph of 2x + 3y = 6?

(1) 0,2 (2) 2,3 (3) 3,0 (4) 6,-2

The graph of 3x - y = 3 intersects the x-axis at the point:

(1) 1,0 (2) 0,1 (3) 0,3 (4) 3,0

The graph of 3x - y = 6 contains the point:

(1) 0,2 (2) 5,9 (3) 4,-6 (4) 1,9

If the point (K,4) lies on the graph of 2x + y = 10, what is the value of K?

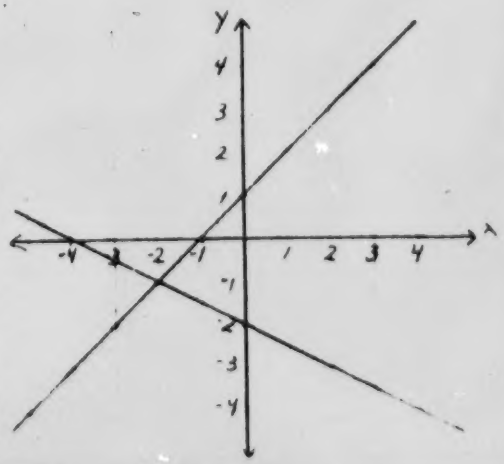
d) intersection of 2 lines

Examples:

What is the solution of the system of equations whose graphs are shown?

(1) -1,-2 (2) -2,1

(3) -2,-1 (4) 0,-2



5. Perimeter (circumference), Area, Volume

a) square

Examples:

The perimeter of a square is 36. What is the length of one side of the square?

If the length of a side of a square is represented by 2x, which expression represents its area?

(1) $8x$ (2) $4x$ (3) $4x^2$ (4) $2x^2$

b) rectangle

Examples:

The length of a rectangle is 5 more than its width. If the width is represented by W, which expression represents the area of the rectangle?

(1) $W^2 + 5W$ (2) $W^2 + 5$ (3) $5W^2$ (4) $4W + 10$

If the length of a rectangle is doubled and the width is also doubled, then the perimeter must be:

(1) doubled (2) increased by 2 (3) increased by 4 (4) multiplied by 4

If the length of a rectangle is represented by $2x - 3$ and its width is represented by $3x$, what is the area of the rectangle in terms of x?

(1) $6x^2 - 9x$ (2) $6x^2 - 3$ (3) $10x - 6$ (4) $5x - 3$

c) trapezoid

Examples:

See Part II Questions

d) triangle

Examples:

If the sides of a triangle are represented by $2x$, $x + 5$, and $3x - 6$, express the perimeter of the triangle in terms of x.

The area of a triangle is 40 square centimeters. If the base of the triangle is 10 centimeters, find the number of centimeters in the height.

The lengths of the sides of a triangle are represented by $a + 2b$, $a + b$, and $2a - b$. Express the perimeter of the triangle as a binomial.

e) circle

Examples:

What is the area of a circle whose radius is 5?
(1) 100π (2) 25π (3) 10π (4) 5π

If the area of a circle is 64π, what is the radius of the circle?

Find the radius of a circle whose area is 25π.

Find the circumference of a circle whose radius is 6. (Answer may be left in terms of π.)

If the radius of a circle is 10, the area of the circle is: (1) 10π (2) 20π (3) 100π (4) 100

f) cube/cylinder

Examples:

The volume of a cylinder is found by using the formula $V = \pi r^2 h$. If h is doubled, then the volume is: (1) doubled (2) increased by 2 (3) increased by 4 (4) multiplied by 4

6. Angles of a Circle

a) central

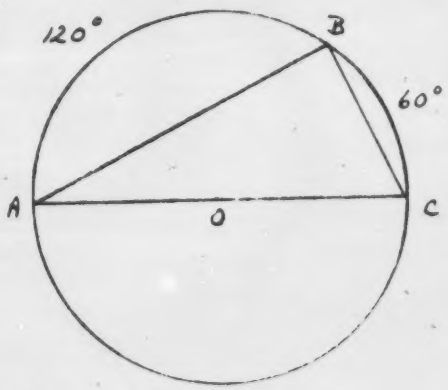
Examples:

See Part II Questions

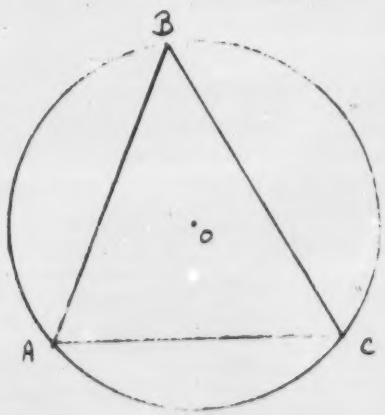
b) inscribed

Examples:

In the accompanying figure, $\triangle ABC$ is inscribed in circle O. Arc AB measures 60°. Find the number of degrees in angle B.

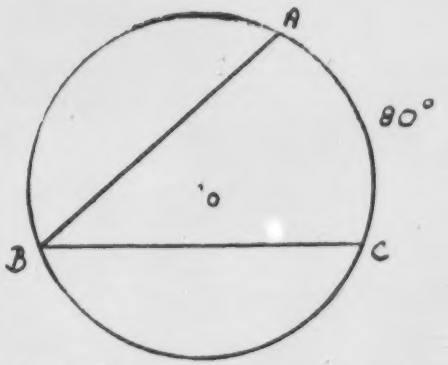


In the accompanying figure, equilateral triangle ABC is inscribed in circle O. Find the number of degrees in arc AB.



In the accompanying figure, ABC is inscribed in circle O and mAB = 80. Find the number of degrees in ACB.

As shown in the accompanying diagram, angle ABC is inscribed in circle O and the measure of arc AC = 80°. Find the number of degrees in the inscribed angle ABC.

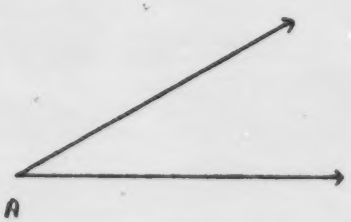


7. Construction

Examples:

Directions: Leave all construction lines on the answer sheet.

On the answer sheet, using point B as the vertex, construct an angle congruent to angle A. (Use compass and straightedge.)



Part II Questions

1. Graphing

a) simultaneous equalities

Examples:

Solve graphically and check: $y = x - 3$

$2x + y = 3$ (8,2)

Solve graphically and check: $2x + y = 8$

$y = 3x - 2$ (8,2)

b) simultaneous inequalities

Examples:

On the same set of coordinate axes, graph the following system of inequalities and label the solution set A.

$2x - y \quad 3$

$3x + y \quad 7$ (8,2)

On the same set of coordinate axes, graph the following system of inequalities:

$y \quad x - 2$

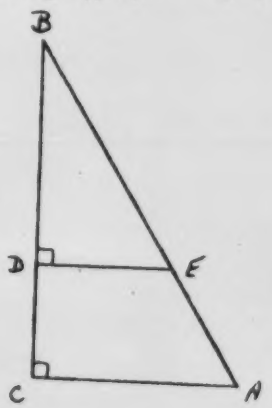
$y \quad -2x + 4$ (8)

Write the coordinates of a point which is not in the solution set of the system of inequalities graphed. (2)

2. Geometric Solutions of Figures

Examples:

In the diagram, $\angle BDE$ and $\angle BCA$ are right angles, $\triangle ABC$ is similar to $\triangle EBD$, BC = 12, AC = 9, and BD = 8.



a. Find DE. (2)

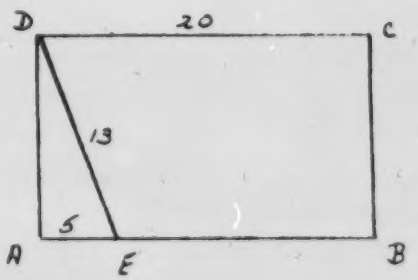
b. Find BE. (2)

c. Find the area of triangle ABC. (2)

d. Find the area of $\triangle BDE$. (2)

e. Find the area of trapezoid CAED. (2)

As shown in the accompanying figure, ABCD is a rectangle, E is a point on $\overline{AB}$, DE = 13, AE = 5, and DC = 20.



a. Find AD. (2)

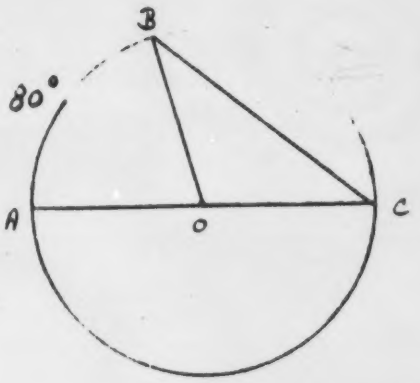
b. Find the perimeter of trapezoid EBCD. (2)

c. Find the area of $\triangle AED$. (2)

d. Find the area of rectangle ABCD. (2)

e. Find the area of trapezoid EBCD. (2)

In the accompanying figure, $\overline{AC}$ is a diameter of circle O. The measure of arc AB is 80°.



a. Find, in degrees, the measure of $\angle AOB$. (2)

b. Find, in degrees, the measure of $\angle ACB$. (2)

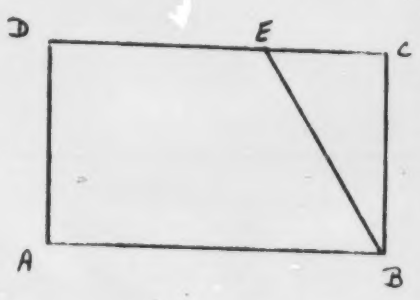
c. If the area of the circle is 49π, find the length of the radius. (2)

d. If the area of the circle is 49π, find the circumference of the circle in terms of π. (2)

e. Triangle COB is:

(1) scalene (2) isosceles (3) equilateral (4) right (2)

As shown in the accompanying diagram, ABCE is a rectangle and a line segment drawn from B intersects $\overline{CD}$ at E.



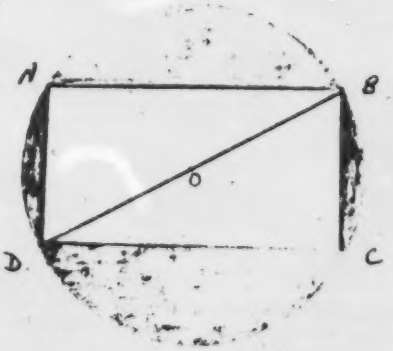
a. If the measure of $\overline{AB}$ is 9 and the area of the rectangle is 36, find AD. (2)

b. The point E separates DC into two segments such that DE:EC = 2:1. Find DE and EC. (2)

c. Find BE. (3)

d. Find the area of trapezoid ABED. (3)

In the accompanying figure, rectangle ABCE is inscribed in circle O and $\overline{DB}$ is a diameter. The radius of the circle is 5. (Answers may be left in terms of π.)



a. Find the area of the circle. (2)

b. If CD = 8, find BC. (3)

c. Find the area of $\triangle BCD$. (2)

d. Find the area of rectangle ABCD. (1)

e. Find the area of the shaded portion of the figure. (2)

G-1-1a

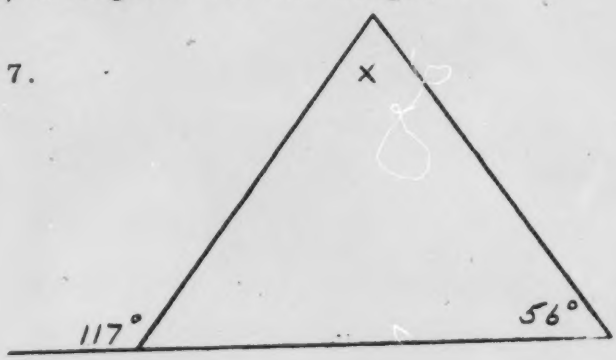
Exercises for Angles of a Triangle (including Complementary & Supplementary

1. If two angles of a triangle measure 25° and 65°, what is the measure of the third angle?
2. If the vertex angle of an isosceles triangle measures 40°, find the measure of each of the base angles.
3. Two supplementary angles are in the ratio of 3:6, find the measure of both angles.
4. If the three angles of a triangle are in the ratio of 3:4:5, find the number of degrees in each angle.
5. Find the measures of the three angles in a right isosceles triangle.

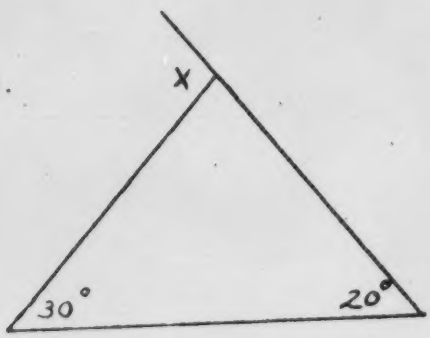
6-10. Find the measure of angle X and/or angle Y in the diagram.

6.

7.

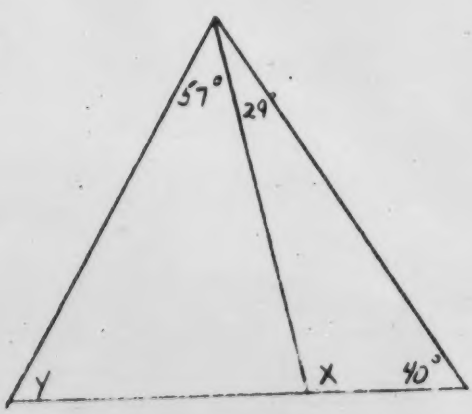


8.



9.

10.



G-1-1b

Exercises for Similar Triangles

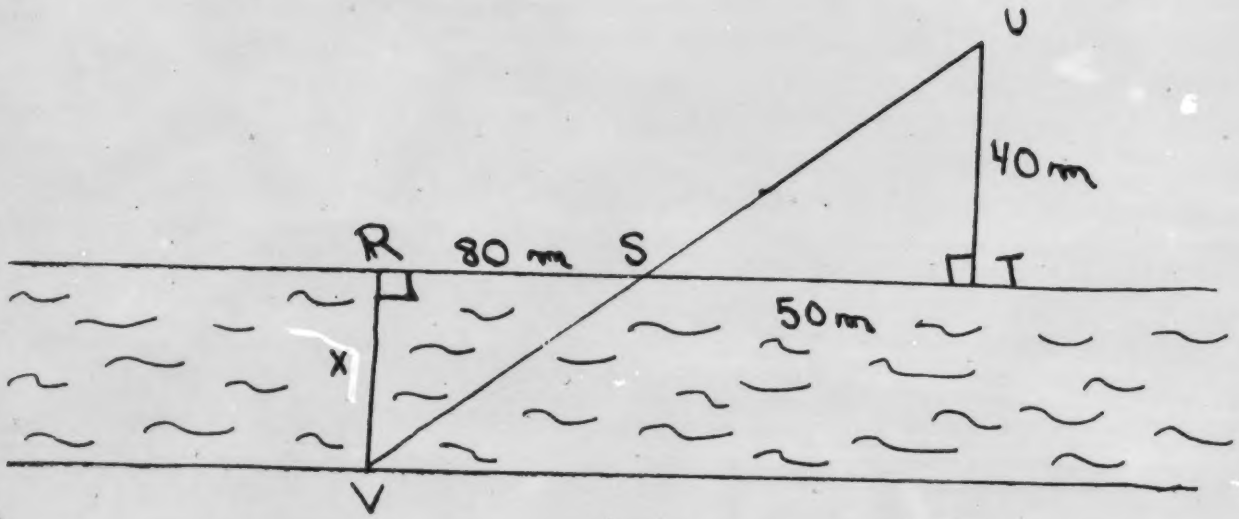
1. The lengths of triangle ABC are 7,8, and 10. Triangle XYZ is similar to triangle ABC. The longest side of triangle XYZ is 40. What is the shortest side of triangle XYZ?

2. If a telephone pole 18 feet high casts a shadow of 8 feet long at the same time that a tree casts a 28 foot shadow, how high is the tree?

3. Triangle ABC is similar to triangle DEF, angle A is congruent to angle D and angle B is congruent to angle E. AC = 36, AB = 24, and DF = 15. Find DE!

4. Jim walked 8 meters up a ramp and was 3 meters above the ground. If he walked 12 meters further up the ramp, how far above the ground would he be?

5. Triangle VRS is similar to triangle UTS. Find the width of the river.

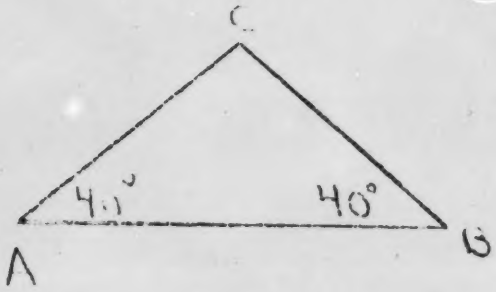


G-1-1c

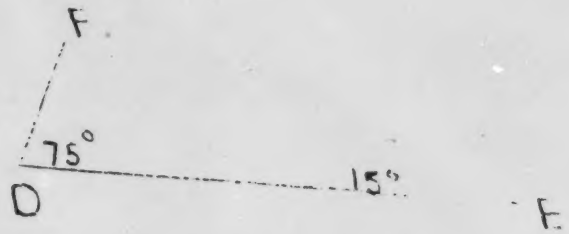
Exercises for Congruent Triangles

From the following triangles, select pairs that are congruent. In each pair name the corresponding angles and sides.

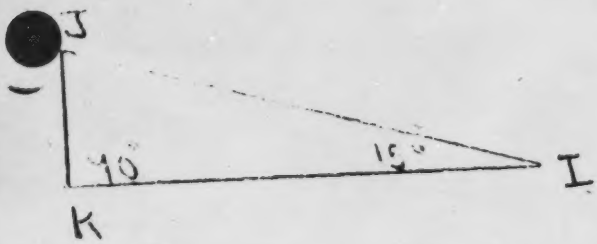
1.



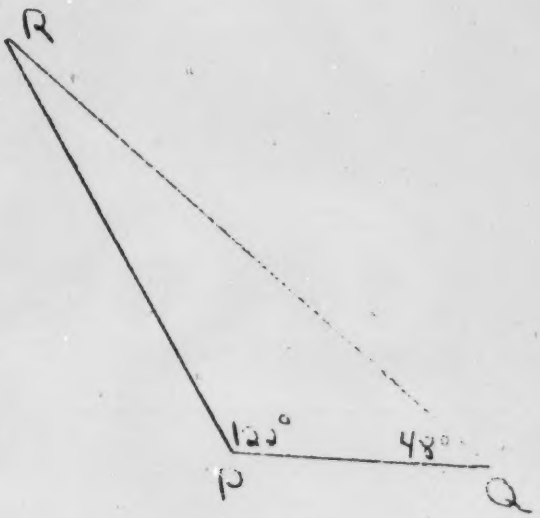
2



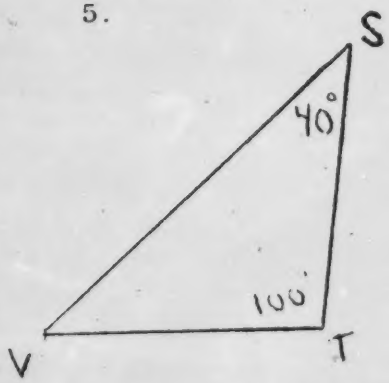
3.



4.



5.



6.

G-1-2

Exercises for Pythagorean Theorem

1. The hypotenuse of a right triangle measures 17. If one leg of the triangle measures 15, find the measure of the other leg.

2. Find the length of the side of a square if the length of its diagonal is 4 cm.

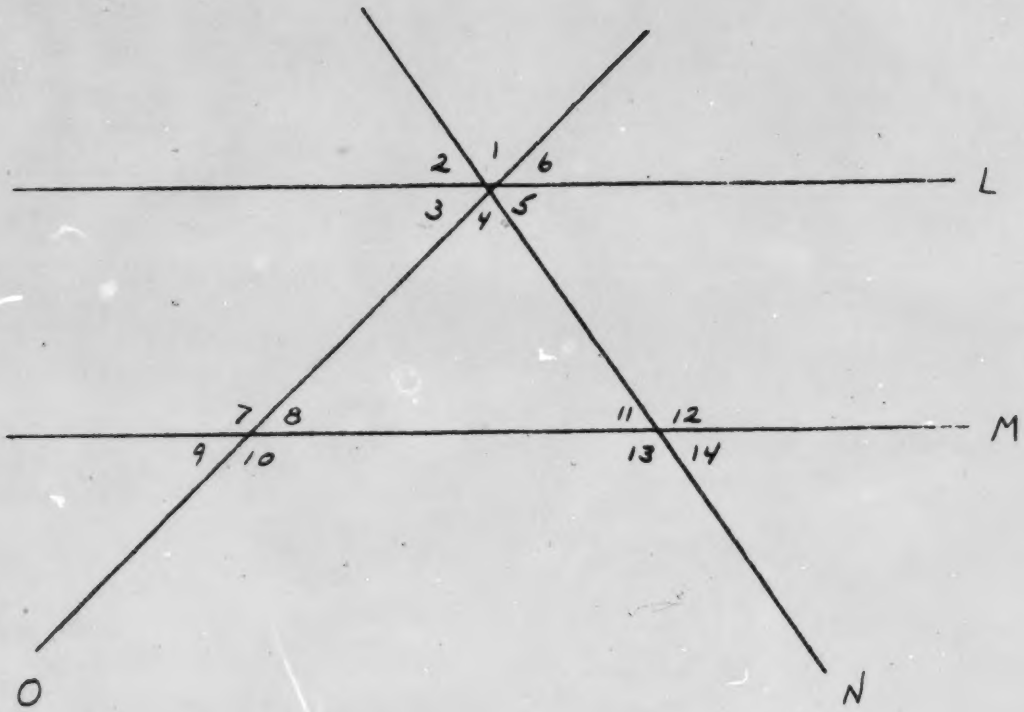
3. A ten foot ladder is placed against a house so that the foot of the ladder is 4 feet from the base of the house. To the nearest tenth of a foot, find how far up the side of the house the ladder reachers.

4. If the length of one leg of an isosceles right triangle is 6, what is the length of the hypotenuse.

5. Paul walked 8 km North and 3 km West. How far was he from his starting point?

G-1-3

Exercises for Angles



In the diagram above, lines L and M are parallel and lines O and N are transversals intersecting lines L and M. The measure of angle 1 is 72^{o}. The measure of angle 8 is 30^{o}.

Angle 2 = _____
Angle 3 = _____
Angle 4 = _____
Angle 5 = _____
Angle 6 = _____
Angle 7 = _____
Angle 8 = _____

Angle 9 = _____
Angle 10 = _____
Angle 11 = _____
Angle 12 = _____
Angle 13 = _____
Angle 14 = _____

G-1-4a

Exercises for Slope and Y-intercept

Put the following in standard form and tell the slope and y-intercept.

1. $y = 3x - 7$ — 1. _____ slope = ___ y-int = ___
2. $y = -2x - 1$ — 2. _____ slope = ___ y-int = ___
3. $y - 5 = x$ — 3. _____ slope = ___ y-int = ___
4. $y - x = 1/2$ — 4. _____ slope = ___ y-int = ___
5. $3y - 9x = 1$ — 5. _____ slope = ___ y-int = ___
6. $1 + 2y = 4x$ — 6. _____ slope = ___ y-int = ___
7. $X + y - 4 = 0$ — 7. _____ slope = ___ y-int = ___

Put the following in standard form and tell which pairs are parallel or perpendicular.

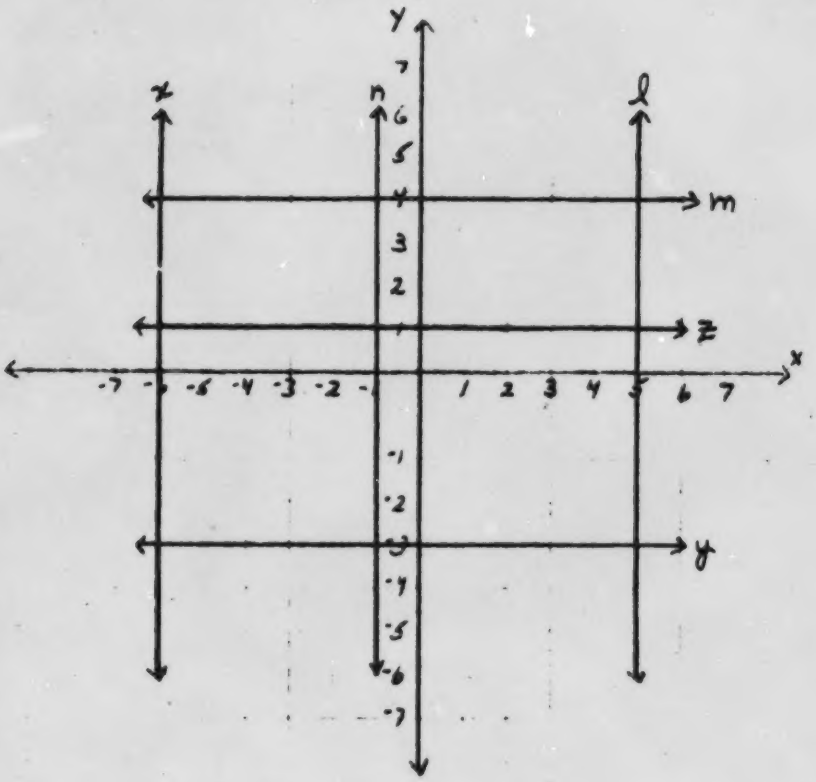
9. $y - 2x = 5$ — 9. _____
10. $2y + x = -12$ — 10. _____
11. $3y = x$ — 11. _____
12. $3 = 2x - y$ — 12. _____
13. $2y = -6x$ — 13. _____

Parallel lines _____

Perpendicular lines _____

G-1-4b

Exercises for Identifying Vertical and Horizontal Lines



Write the equation for the lines above.

1. l _____

2. m _____

3. n _____

4. x _____

5. y _____

6. z _____

G-1-4c

Exercises for Point on a Line

For problems 1 - 5, the point given is on the line. Find the value of K in each of the points.

1.	$2x - y = 7$	(K,3)	1. _____
2.	$2x + 3y = 12$	(K,-2)	2. _____
3.	$x - 3y = 0$	(6,K)	3. _____
4.	$4y = 3x - 16$	(K,8)	4. _____
5.	$y = -\frac{4}{5}x + 7$	(K,3)	5. _____

True or False - The point given is on the line.

6.	$-3x + y = 7$	(2,-1)	6. _____
7.	$y = -4X + 5$	(2,-3)	7. _____
8.	$y = \frac{2}{3}x + 6$	(-3,4)	8. _____
9.	$y = 5x - 3$	(-1,-2)	9. _____
10.	$\frac{1}{2}x = y - 8$	(4,10)	10. _____

G-1-5a

Exercises for Perimeter and Area of a Square.

Tell the area given the perimeter.

1. 40 — 1. _____

2. 28 — 2. _____

3. 4x — 3. _____

Tell the perimeter given the area.

4. 25 — 4. _____

5. 81 — 5. _____

6. $9x^2$ — 6. _____

7. Find the area of a square whose diagonal is 12 — 7. _____

8. If a side of a square is doubled, what happens to the area? — 8.a) _____

What happens to the perimeter? — b) _____

G-1-5b

Exercises for Perimeter and Area of a Rectangle

Express the rectangle's area as a binomial or trinomial.

1. Length = 2X - 3, Width = X 1. _____
2. Length = X - 3, Width = X + 3 2. _____
3. Length = 2X + 2, Width = 2X 3. _____
4. Length = X + 5, Width = X - 1 4. _____
5. The perimeter of a rectangle is 50 cm and one side is 15 cm. Find the other sides. 5. _____

6. How long is each side of a rectangle if its perimeter is 140 and 2 adjacent sides have lengths of 3X and 2X + 10? 6. _____

7. The perimeter of a rectangle is 68 cm. The length is 2 cm more than three times the width. Find the length and the width. 7. _____

8. The area of a square exceeds the area of a rectangle by 4. The width of the rectangle is 3 less than the width of the square and its length is 4 more than the length of the square. Find a side of the square. 8. _____

G-1-5c

Exercises for Perimeter and Area of a Triangle.

Tell the perimeter if the three sides are as given:

1. $2x, x + 7, 2x - 3$ 1. _____

2. $3x - 9, 2x + 3, x - 9$ 2. _____

3. $2A + 7, A - 9, 4A + 2$ 3. _____

4. If the base of an isosceles triangle measures X - 4 inches and each of the legs is 6 inches, what is the perimeter of the triangle?

5. The perimeter of an isosceles triangle measures 24 inches and the length of the base is 6 inches. How long are the other sides?

6. The lengths of the sides of a traingle are consecutive integers. If the perimeter of the triangle is 18 inches, find the lengths of the sides of the triangle.

Supply the missing information for the following triangles:

	AREA	BASE	HEIGHT
7.	56 sq. cm	_____	16
8.	80X	5X	_____
9.	_____	2x - 4	2x + 4
10.	_____	3x - 8	$2x^2$

G-1-5d

Exercises for Circumference and Area of a Circle.

All answers may be left in terms of π.

Find the area and circumference.

1. Radius = 8 — 1. _____ _____

2. Diameter = 9 — 2. _____ _____

3. Radius = $5\sqrt{2}$ — 3. _____ _____

4. Diameter = $20X$ — 4. _____ _____

Find the radius.

5. Area = 121π — 5. _____

6. Circumference = 28π — 6. _____

7. Area = $\frac{16}{25}\pi$ — 7. _____

8. Circumference = $6A\pi$ — 8. _____

9. Circumference = $6\sqrt{5}\pi$ — 9. _____

10. Area = $64Y^2\pi$ — 10. _____

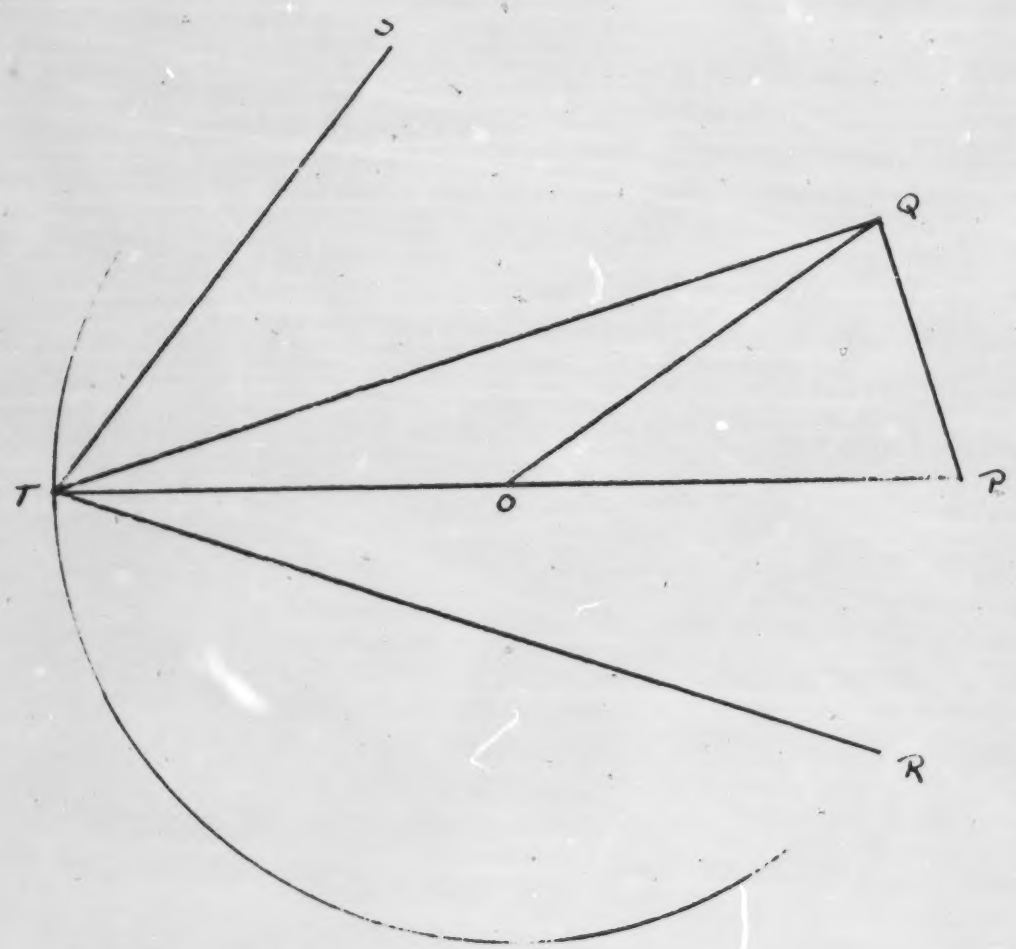
11. Find the circumference of a circle whose area is 16π. — 11. _____

12. Find the area of a circle whose circumference is 26π. — 12. _____

G-1-6

Exercises for Angles of a Circle.

In circle O with diameter $\overline{TP}$, m $\overset{\frown}{QP} = 40^{\circ}$, M$\measuredangle$RTP = M$\measuredangle$STQ = 25°, find the measure to answer the questions below the circle.



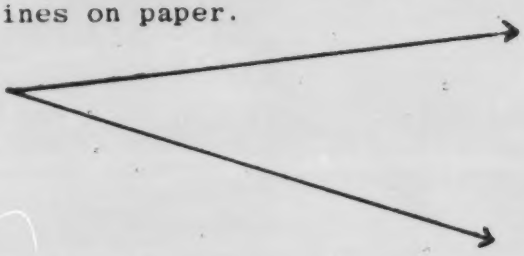
1.	$\measuredangle$ POQ =	1. _____
2.	$\overline{PR}$ =	2. _____
3.	$\measuredangle$ QOT =	3. _____
4.	$\overset{\frown}{RT}$ =	4. _____
5.	$\measuredangle$ TQP =	5. _____
6.	$\overset{\frown}{ST}$ =	6. _____
7.	$\overset{\frown}{PQS}$ =	7. _____
8.	$\measuredangle$ TPQ =	8. _____
9.	$\measuredangle$ QTR =	9. _____
10.	$\overset{\frown}{TQP}$ =	10. _____

G-1-7

Exercises for Construction.

Bisect the following using only straight edge and compass. Leave all construction lines on paper.

1.



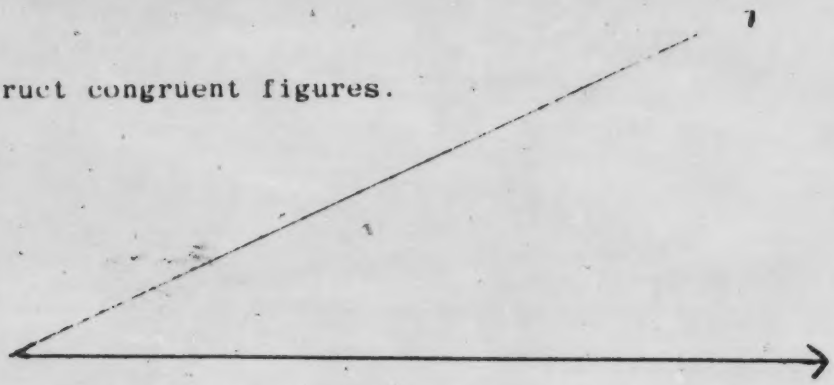
2.

3.

4.

Construct congruent figures.

5.

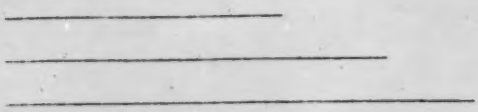


6.

7.

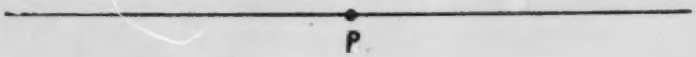
8.

9. Given the following 3 line segments, construct a triangle.

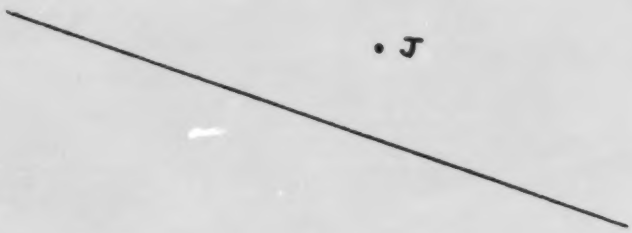


10. Construct a triangle given the following two angles and included line segment.

11. Construct a line perpendicular to the given line at point P.



12. Construct a line perpendicular to the given line passing through point J.



G-2-1a

Exercises for Simultaneous equations

Solve graphically and check your answers.

1. $3X + Y = 6$
   $Y = 3X$

2. $y = -4X + 5$
   $y - 3X = -9$

3. $y = -2x - 1$
   $y = 1/2x - 4$

4. $3x - 2y = 4$
   $y = -2x + 5$

5. $x - y = 2$
   $y = 3/2x - 3$

6. $2x + y = 3$
   $2y = -2x + 5$

G-2-1b

Exercises for Inequalities

On the same set of coordinate axes, graph the following systems of inequalities and label the solution set A.

1. $y > 3x - 4$
   $2y \leq 4x - 6$

2. $y \geq 2x + 3$
   $y + 4 \geq 2x$

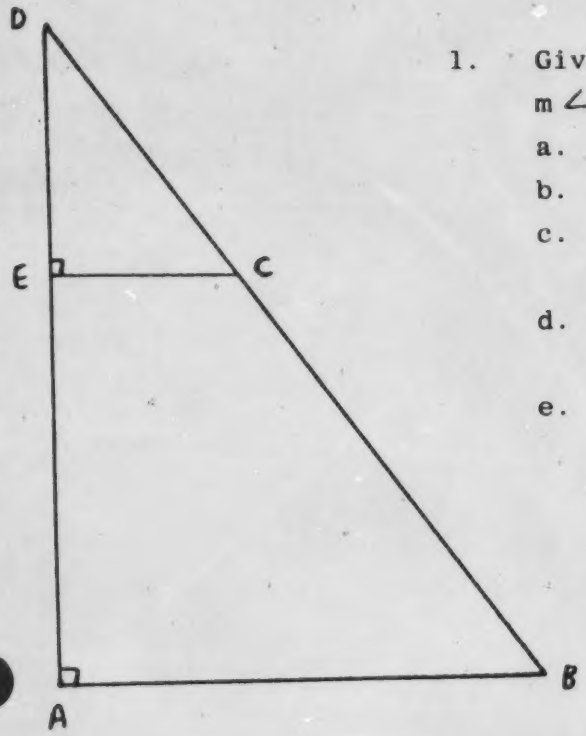
3. $x > y$
   $y \leq -x + 3$

4. $y > x + 5$
   $y \leq 2$

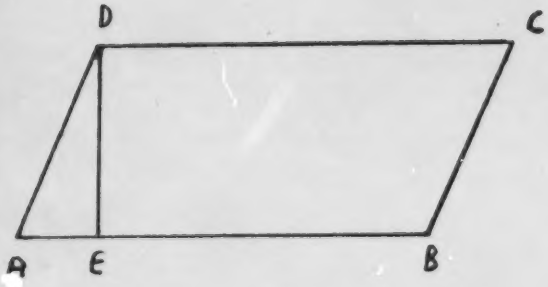
5. $x < 4$
   $y \geq -5$

6. $y > 2x - 3$
   $x - 3y < 9$

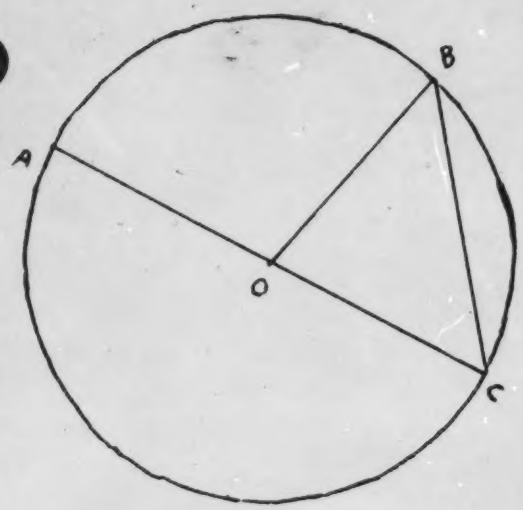
Exercises for Geometric Figures



1. Given triangles ABD and ECD with m∠DEC = m ∠DAB = 90^{o} and AB = 16, AE = 9, and AD = 24.
   a. Find EC. _____
   b. Find DE. _____
   c. Find the area of triangle ABD. _____
   d. Find the area of triangle DEC. _____
   e. Find the area of trapezoid EABC. _____



2. Given parallelogram ABCD with altitude DE and AE = 9, DE = 12, and DC = 30.
   a. Find AD. _____
   b. Find the perimeter of trapezoid EBCD _____
   c. Find area of triangle AED. _____
   d. Find area of parallelogram ADCB. _____
   e. Find area of trapezoid EBCD. _____



3. Given circle O with diameter AC and $m\overset{\frown}{BC} = 75^{\circ}$.

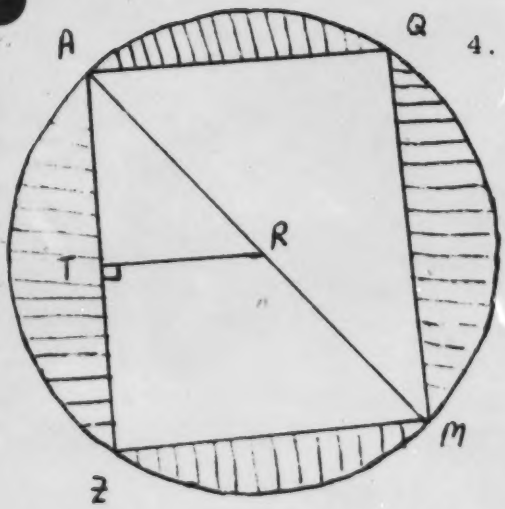
a. Find $m\angle AOB$ _____

b. Find $m\overset{\frown}{ACB}$ _____

c. If the area of the circle is 81π find the radius. _____

d. If the area of the circle is 81π find the circumference. _____

e. Identify the type of triangle that BOC is: _____



4. Given circle R with inscribed rectangle AQMZ. QZ is a diagnoal and a diameter. RT is perpendicular to AZ and the radius is 10, RT = 6, and QM = 16.

a. Find TZ. _____

b. Find AQ. _____

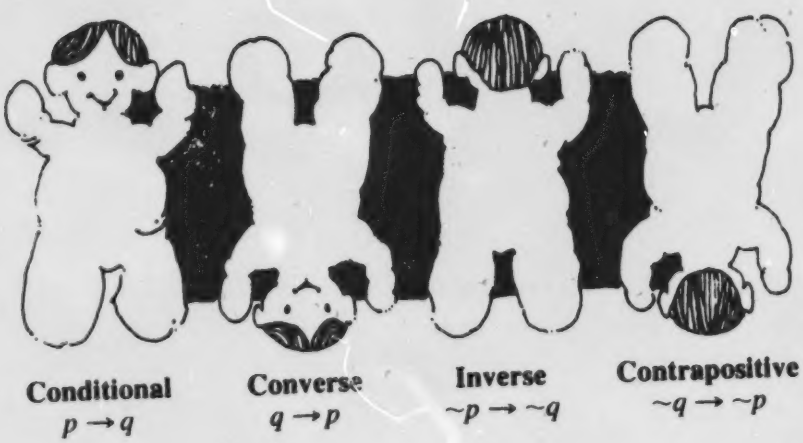
c. Find perimeter of trapezoid AQRT. _____

d. Find area of rectangle AQMZ. _____

e. Find area of circle R. _____

f. Find area of shaded part. _____

g. Find area of pentagon QMZTR. _____


Conditional
$p \rightarrow q$
Converse
$q \rightarrow p$
Inverse
$\sim p \rightarrow \sim q$
Contrapositive
$\sim q \rightarrow \sim p$

L. Logic

Part I Questions

1. Converse, Inverse, and Contrapositive

Examples:

What is the inverse of the statement, "If n is an odd integer, then n + 2 is an odd integer"?

(1) If n is an odd integer, then n + 2 is not an odd integer.

(2) If n is not an odd integer, then n + 2 is not an odd integer.

(3) If n + 2 is an odd integer, then n is an odd integer.

(4) If n + 2 is not an odd integer, then n is not an odd integer.

What is the converse of $\sim p \rightarrow q$?

(1) $p \rightarrow q$ (2) $p \rightarrow \sim q$ (3) $\sim q \rightarrow p$ (4) $q \rightarrow \sim p$

What is the inverse of $\sim p \rightarrow q$?

(1) $p \rightarrow \sim q$ (2) $q \rightarrow \sim p$ (3) $\sim q \rightarrow p$ (4) $p \rightarrow q$

Given the true statement: If a figure is a square, then it is a rectangle." Which sentence is also true?

(1) If a figure is a rectangle, then it is a square.

(2) If a figure is not a square, then it is not a rectangle.

(3) If a figure is a square, then it is not a rectangle.

(4) If a figure is not a rectangle, then it is not a square.

What is the inverse of the statement, "If I study then I will pass?"

(1) If I pass, then I did study.

(2) If I do not pass, then I did not study.

(3) If I do not study, then I will not pass.

(4) If I study, then I will not pass.

Given the true statement, "If I live in Lake Placid, then I live in New York State." Which statement must be true?

(1) If I do not live in Lake Placid, then I do not live in New York State.

(2) If I do not live in New York State, then I do not live in Lake Placid.

(3) If I live in New York State, then I live in Lake Placid.

(4) I live in Lake Placid and I do not live in New York State.

Which has the same truth value as the statement, "If Bill pitched, then we won the game"?

(1) If we won the game, then Bill pitched.

(2) If we did not win the game, then Bill did not pitch.

(3) If Bill pitched, then we did not win the game.

(4) If Bill did not pitch, then we did not win the game.

What is the contrapositive of the statement $p \rightarrow q$?

(1) $p \leftrightarrow q$ (2) $q \rightarrow p$ (3) $\sim p \rightarrow \sim q$ (4) $\sim q \rightarrow \sim p$

2. Symbolic

a) Write statements in symbolic form.

P represents "It is cold" and Q represents "I will go skiing." Using P and Q, write in symbolic form: "If it is cold, then I will not go skiing."

If p represents "Today is Monday" and q represents "Tomorrow is Wednesday," write in symbolic form using p and q: "If today is Monday, then tomorrow is not Wednesday."

Let p represent, "You are correct," and let q represent, "I agree." Using p and q, write in symbolic form, "You are correct and I agree."

If p represents the statement, "I try," and q represents the statement, "I will succeed," write in symbolic form using p and q: "If I try, then I will succeed.

b) State the truth value of a given statement.

Let p represent: X is odd. Let q represent: $x > 8$. When x is 6, which is true?

(1) p (2) q (3) $p \rightarrow q$ (4) $p \wedge q$

Let p represent "x is a prime number" and let q represent "x is an odd number". Which is true if x = 15?

(1) p (2) $\frown q$ (3) $p \wedge q$ (4) $p \vee q$

Let p represent "The polygon has exactly 3 sides," and let q represent "All angles of the polygon are right angles." Which is true if the polygon is a rectangle?

(1) $p \wedge q$ (2) $p \vee q$ (3) p (4) $\sim q$

3. Conditional and Biconditional

If $p \leftrightarrow q$ is true, which statement must also be true?

(1) $p \wedge q$ (2) $p \vee q$ (3) $p \wedge \sim q$ (4) $p \rightarrow q$

If $p \rightarrow q$ is false, then:

(1) p is true and q is false

(2) p is false and q is true

(3) p and q are both true

(4) p and q are both false

4. Conjunction and disjunction

Which whole number, when substituted for x makes the following sentence true? $(3x > C) \wedge (x < 4)$

The statement $r \vee s$ is false if and only if:

(1) r is true and s is true

(2) r is true and s is false

(3) r is false and s is true

(4) r is false and s is false

If $p \vee q$ is false, then:

(1) p is true and q is false

(2) p is false and q is true

(3) both p and q are true

(4) both p and q are false

Part II Questions

1. Truth Tables (tautology)

Copy and complete the truth tables for the statement:

$(p \rightarrow q) \longleftrightarrow (q \vee \sim p)$.

p	q	$p \rightarrow q$	$\sim p$	$q \vee \sim p$	$(p \rightarrow q) \longleftrightarrow (q \vee \sim p)$

Why is $(p \rightarrow q) \longleftrightarrow (q \vee \sim p)$ a tautology?

On your answer paper, copy and complete the truth table for the statement: $[(p \rightarrow q) \wedge \sim q] \longleftrightarrow \sim p$.

p	q	$p \rightarrow q$	$\sim q$	$[(p \rightarrow q) \wedge \sim q]$	$\sim p$	$(p \rightarrow q) \wedge \sim q \longleftrightarrow \sim p$

Is $[(p \rightarrow q) \wedge \sim q] \longleftrightarrow \sim q$ a tautology?

On your answer paper, copy and complete the truth table for the statement: $[(p \rightarrow q) \wedge \sim q] \rightarrow \sim p$.

p	q	$p \rightarrow q$	$\sim q$	$(p \rightarrow q) \wedge \sim q$	$\sim p$	$[(p \rightarrow q) \wedge \sim q] \rightarrow \sim p$

Is $[(p \rightarrow q) \wedge \sim q] \rightarrow \sim p$ a tautology? Justify the answer you gave above.

On your answer paper, copy and complete the truth table for the statement: $(p \rightarrow q) \longleftrightarrow (\sim p \rightarrow \sim q)$.

p	q	$p \rightarrow q$	$\sim p$	$\sim q$	$\sim p \rightarrow \sim q$	$(p \rightarrow q) \longleftrightarrow (\sim p \rightarrow \sim q)$

Which statement is true?

(1) A conditional and its inverse always have the same truth value.

(2) A conditional and its contrapositive do not always have the same truth value.

(3) A conditional and its converse always have the same truth value.

(4) A conditional and its inverse do not always have the same truth value.

Copy and complete the truth table for the statement:

$\sim(p \rightarrow q) \longleftrightarrow (p \wedge \sim q)$

p	q	$p \rightarrow q$	$\sim(p \rightarrow q)$	$\sim q$	$(p \wedge \sim q)$	$\sim(p \rightarrow q) \leftrightarrow (p \wedge \sim q)$

Is $\sim(p \rightarrow q) \leftrightarrow (p \wedge \sim q)$ a tautology? Justify the answer given above.

L-1

Exercises for Logic Part I

1. p = It is raining. Q = I will go fishing.

   Write in words:

   (a) $p \cap q$

   (b) $p \vee q$

   (c) $\sim p \cap q$

   (d) $q \rightarrow p$

   e) $p \rightarrow q$

   f) $\sim p \rightarrow \sim q$

   g) $\sim q \rightarrow \sim p$

   h) $p \longleftrightarrow q$

2. Write each statement in symbolic form using the letters indicated after the statement.

   (a) Roses are red and violets are blue. (R, V)

   (b) Wilfred passes the test or he will not go to the party. (T,P)

   (c) We'll go for pizza if and only if you'll pay the bill. (G,P)

   (d) If I save my homework for study hall then I won't have enough time. (S,T)

   (e) If Syracuse wins the game and Georgetown loses; then Syracuse will make the playoffs.(S,G,P)

3. Given the statements below, write the converse, inverse and contrapositive:

   (a) If you study hard then you will pass the test.

   (b) If trees are green then flowers smell sweet.

   (c) If people wear shoes then cows are not happy.

   (d) If 2A + 3 = 11 then A = 4.

L-2

Exercises for Logic Part II

Construct a truth table for the following:

1. $p \vee \sim (p \wedge \sim q)$

2. $\sim q \longrightarrow (q \vee p)$

3. $[(p \rightarrow q) \wedge \sim p] \longrightarrow \sim q$

4. $[(p \rightarrow q) \wedge \sim q] \rightarrow \sim p$

5. $[(p \longleftrightarrow \sim q) \vee p] \longrightarrow q$

6. $(p \rightarrow q) \longleftrightarrow (\sim p \vee q)$

7. $[(p \rightarrow a) \wedge (q \rightarrow r)] \longrightarrow (p \rightarrow r)$

8. $p \longleftrightarrow (\sim r \longleftrightarrow \sim q)$

9. Which of the ones above were tautologies?

P. Probability

1. Arrangements

Examples:

What is the total number of possible 5-letter arrangements of the letters D, I, S, C, and O, if each letter is used only once in each arrangement.

A school cafeteria offers 6 kinds of sandwiches and 3 kinds of beverages. If a lunch consists of a sandwich and a beverage, how many different lunches can a student choose?

There are 6 roads between Plattsburgh and Lake Placid. In how many different ways can a person travel from Plattsburgh to Lake Placid and back to Plattsburgh?

If a boy has 5 shirts and 4 pairs of jeans, how many different outfits of a shirt and a pair of jeans does he have?

How many different two-digit numbers can be made from the digits of 345 if a digit can appear just once in a number?

2. Random Event or Happening

a) One Event

Examples:

The mail consists of 3 bills, 2 advertisements, and 1 letter. If the mail is opened randomly, what is the probability that an advertisement is opened first?

A card is drawn from a standard deck of 52 cards. What is the probability that it is a King or an Ace?

An advertising display has 20 red lights, 15 blue lights, 15 green lights, and 10 yellow lights. What is the probability that the first light to burn out is red?

In the accompanying figure, the spinner has five equal sections numbered 1 through 5. If the arrow is equally likely to land on any of the sections, what is the probability that it will land on an even number on the next spin?

An urn contains 2 red marbles, 4 blue marbles, and 3 yellow marbles. If a single marbel is randomly picked from the urn, what is the probability that a red or blue marbel is picked?

A letter is chosen at random from the letters of the word "H U N D R E D". What is the probability that the letter chosen is an "E"?

From the standard deck of playing cards, what is the probability of randomly drawing a black card or a King on one draw?

(1) $\frac{5}{52}$ (2) $\frac{4}{52}$ (3) $\frac{28}{52}$ (4) $\frac{30}{52}$

b) Two Events

Examples:

Two fair dice are tossed. Each die has six faces numbered 1 to 6. What is the probability that each die shows a 5?

If 2 six-sided dice are rolled, what is the probability of getting a sum of 3?

(1) $\frac{3}{36}$ (2) $\frac{2}{36}$ (3) $\frac{3}{36}$ (4) $\frac{2}{6}$

3. Event Not Happening

Examples:

If the probability of an event happening is $\frac{2}{5}$, what is the probability of the event not happening?

If the probability that Robin's team will win is $\frac{4}{5}$, what is the probability that they will not win.

If the probability that Jones will win the election is 0.6, what is the probability that Jones will not win the election?

The probability we will win the baseball game is $\frac{3}{5}$.

What is the probability we will not win the game?

4. Factorial

Examples:

The symbol for n factorial is n! The value of 3! is:

(1) 6 (2) 5 (3) 3 (4) -3

The value of 5! is:

(1) $\frac{1}{5}$ (2) 15 (3) 120 (4) 5

Part II Questions

Tree Diagrams or Sample Space

The first step of an experiment is to pick one number from the set $\{1,2,3\}$. The second step of the experiment is to pick one number from the set $\{1,4,9\}$.

(a) Draw a tree diagram or list the sample space of all possible pairs of outcomes.

(b) Determine the probability that:

1) both numbers are the same

2) the second number is the square of the first

3) both numbers are odd

In a certain class, there are 4 students in the first row: three girls, Ann, Barbara, and Cathy, and one boy, David. The teacher called one of these students to the board to solve a problem. When the problem was done, the teacher called one of the remaining students in the first row to do a second problem at the board.

a) Draw a tree diagram or list the sample space of all possible pairs of names for calling two students to the board.

b) Find the probability that the teacher called Ann first and Barbara second.

c) Find the probability that the teacher called two girls to the board.

d) Find the probability that David was one of the two students called.

A student has the following five books in his locker: math, history Latin, science, and English. Without looking at the books, he pulls out one book and then, without replacing the first book, pulls out a second book.

a) Using the letters M,H,L,S and E, draw a tree diagram or write the sample space for pulling two books from the locker. (6)

b) What is the probability that he first pulled the math book and then the English book? (2)

c) What is the probability that he pulled out two different books? (2)

A contest offers a first prize of $10,000 or a car. The second prize is $500 or a television set or a set of encyclopedias.

a) Make a tree diagram or write the sample space of all possible pairs of first and second prizes. (4)

b) If each prize is equally likely to be chosen, find the probability that:

1) both prizes are money (2)

2) neither prize is money (2)

3) one prize is money but the other is not (2)

P-1-1

Exercises on Arrangements

1. Use the set: 1,2,3,4,5

   (a) How many 3 digit numbers can be made from the set with no digits repeated? a. _____

   (b) How many 3 digit numbers can be made from the set if digits can be repeated? b. _____

   (c) How many 3 digit numbers can be made if the hundreds' digit and the tens' digit are the same but the units' digit is different? c. _____

   (d) How many even 3 digit numbers can be made? (digits may be repeated) d. _____

   (e) How many odd 3 digit numbers can be made? (digits may be repeated) e. _____

2. A restaurant has the following choices: 3 beverages, 3 appetizers, 6 main courses and 4 desserts. Answer the following:

   (a) How many different meals with a beverage and a main course could you order? a. _____

   (b) How many different meals with a main course and a dessert could you order. b. _____

   (c) How many different meals with an appetizer and a dessert could you order? c. _____

   (d) How many different meals with a beverage, a main course and a dessert could you order. d. _____

   (e) How many different full meals could you order? e. _____

3. There are 4 roads from DeRuyter to McGraw and 5 roads from McGraw to Marathon. How many roads can you take from DeRuyter to Marathon that go through McGraw? 3. _____

4. Joe's Pizza Place sells small, medium and large pizzas. Joe offers peppers, onions, suasage, mushrooms, and anchovies as toppings. How many different pizzas could you order if:

   (a) you order 1 topping? a. _____

   (b) You order 2 toppings? b. _____

P-1-2

Exercises for Random Events

1. The following is in a box: 3 red balls, 5 yellow balls, 4 orange balls, and a plum. Matilda draws one object. Tell the probability for her getting each:

   (a) a yellow ball — a. _____

   (b) a plum — b. _____

   (c) an orange ball — c. _____

   (d) either a yellow or an orange ball — d. _____

   (e) an apple — e. _____

   (f) not getting a red ball — f. _____

   (g) not getting an orange ball or a plum — g. _____

2. In a group of 100 persons, 85 had RH+ blood, 45 had type O blood, and 38 had both type O and RH+ blood. If one person was selected at random from the group, what is the probability that:

   (a) his blood type was not O — a. _____

   (b) his blood type was RH- — b. _____

   (c) his blood type was O and RH- — c. _____

   (d) his blood type was not O or else was RH+ — d. _____

3. Santa Claus has the following presents in his bag for a party: 5 squirt guns, 1 electronic game, 2 candy bars, and 4 packs of gum. Each child gets two presents picked at random by Santa. What is the probability of:

   (a) getting 2 candy bars — a. _____

   (b) getting 2 squirt guns — b. _____

   (c) getting the electronic game and a pack of gum — c. _____

   (d) getting 3 packs of gum — d. _____

   (e) not getting the electronic game as the first present — e. _____

4. In a game, the player spins a spinner and rolls a die. The spinner has 4 numbers: 1,2,3, and 4. What is the probability of:

   (a) getting a sum of 10 — a. _____

   (b) getting a sum of 7 — b. _____

   (c) getting a negative difference (spinner is subtracted from the die) — c. _____

   (d) getting a product of 12 — d. _____

   (e) getting an even sum — e. _____

P-2

Exercises for Tree Diagrams or Sample Spaces

1. A cooler has five sodas; 2 cokes and 3 root beers. Sidney takes a soda without looking and then Samantha takes a second soda also without looking.

   (a) Draw a tree diagram or list the sample spaces of all possible pairs of outcomes.

   (b) Determine the probability of:

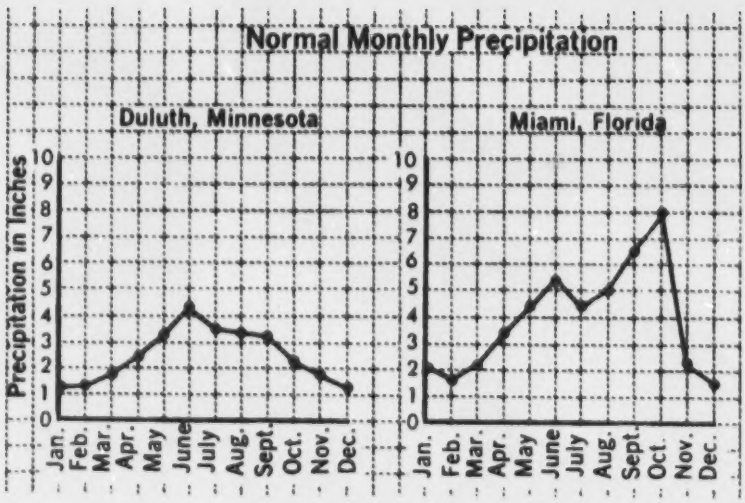
   1) both getting a coke 1. _____
   2) both getting a root beer 2. _____
   3) both sodas are the same 3. _____
   4) getting a root beer and an orange 4. _____
   5) Sidney getting a coke and Samantha getting a root beer 5. _____
   6) Either Sidney or Samantha getting a root beer 6. _____

2. An aquarium has five different inhabitants: catfish (C), starfish (S), goldfish (G), turtle (T), and frog (F). Marlin picks one at random, replaces it, then picks a second at random.

   (a) Draw a tree diagram or list the sample spaces of all possible pairs of outcomes.

   (b) Determine the following probabilities:

   1) Marlin picks the turtle first 1. _____
   2) Marlin picks a turtle 2. _____
   3) Marlin picks a frog and a goldfish 3. _____
   4) Marlin picks the same inhabitant both times 4. _____
   5) Marlin picks the catfish first and the starfish second 5. _____
   6) Marlin does not pick the same inhabitant twice 6. _____


Normal Monthly Precipitation
Duluth, Minnesota
Miami, Florida
Precipitation in Inches
0
1
2
3
4
5
6
7
8
9
10
Jan.
Feb.
Mar.
Apr.
May
June
July
Aug.
Sept.
Oct.
Nov.
Dec.

S. Statistics

Part I Questions

1. Mean (average), Mode, Median

Examples:

Five girls in a club reported on the number of boxes of cookies that they sold: 20,20,40,50, and 70. Which is true?

(1) The median is 20

(2) The mean is 20

(3) The median is equal to the mean

(4) The median is equal to the mode

Express the mean (average) of X + 1 and 3X - 3 as a binomial.

For which set of numbers will the mean, median, and mode all be equal?

(1) 2,2,5 (2) 2,5,5 (3) 2,3,3,4 (4) 2,2,5,5

Find the mode for the following data: 4,5,3,4,5,3,5

If the heights in centimeters of five students are 176, 172, 160, 158, and 158, find the median height for this group of students.

A student received test scores of 82, 94, and 96. What must she receive as a fourth score so that the mean of these four scores will be exactly 90?

Which set of data has more than one mode?

(1) 2,2,4,6,7 (2) 2,2,4,6,9,9 (3) 2,2,2,6,7,9 (4) 2,3,4,6,9,9

The heights of the starting five players on a high school basketball team are 77", 72", 69", 74", and 77". What is the median height of these players?

A student received test grades of 72, 84, and 86. What score must the student receive on a fourth test so that the mean of these scores will be 85?

The high temperatures during five days were 82°, 86°, 91°, 79°, and 91°. Find the mode for these temperatures.

Part II Questions

1. Frequency Tables and Histograms

Examples:

The following data are heights of a group of 15 students:

165, 160, 173, 150, 188, 150, 173, 155, 163, 152, 175, 183, 151, 163, 178.

a. Complete the table below:

Interval	Number (frequency)
180-189	
170-179	
160-169	
150-159	

b. On graph paper, construct a frequency histogram based on the grouped data.

c. In what interval is the median for the group data?

The following table represents the ages of the teachers at a school:

Interval	Number (frequency)
53-57	4
48-52	8
43-47	6
38-42	4
33-37	2
28-32	4
23-27	2

a. In what interval is the median?

b. A teacher is chosen at random form this school. What is the probability that the teacher's age is in the interval 33-37?

c. What is the probability that the age of the teacher from this school is less than 38?

d. What is the probability that a teacher from this school is older than 57?

e. What percent of the teachers are in the interval 43-47?

The following data are test scores for a class of 16 students: 96, 83, 91, 77, 58, 88, 80, 62, 89, 100, 87, 93, 64, 98, 88, and 86.

a. On your answer sheet copy and complete the table:

Interval	Number (frequency)
91-100	
81-90	
71-80	
61-70	
51-60	

b. On graph paper, construct a frequency histogram based on the data.

c. Which interval contains the median?

d. Which interval contains the lower quartile?

A class record showed the following number of misspelled words in each of 25 essays:

Mispelled words	Frequency (Number of Essays)
0	1
1	0
2	3
3	5
4	4
5	9
6	3

a. On graph paper, construct a frequency histogram based on the data.

b. Find the mean number of misspelled words.

c. Find the median number of misspelled words.

d. Find the mode number of misspelled words.

The test scores of 15 students are 86, 57, 69, 82, 91, 87, 75, 84, 68, 65, 91, 88, 81, 62, and 72.

a. On your answer paper copy and complete the table:

Interval	Frequency
90-99	
80-89	
70-79	
60-69	
50-59	

b. On graph paper, draw a frequency histogram based on the data.

c. In which interval does the median lie?

d. What is the probability that a student, selected at random, scored above 89 on this test?

S-1

Exercises for Mean, Median, and Mode

For numbers 1-5 do the following:

a) arrange in order
b) find mean
c) find median
d) find mode
e) find range

	a	b	c	d	e
1.	80,88,96,88				
2.	70,80,80,70,70				
3.	10,6,4,10,6,10				
4.	30,22,40,24,48, 22,42,20,28,38				
5.	X + 2, X - 5, X, X + 2, X + 7, X				

Find the missing number

6.	20,40, ___, 50,60,65,70	mean = 50
7.	40,80,80,97, ___,	mean = 79
8.	23,-8,17, ___,0	mean = 4
9.	3.2, 7.8, ___, 4.5	mean = 5.4
10.	___, 79,83,84	mean = 81¼

S-2

Exercises for Frequency Tables and Histograms.

1. The 32 students in a certain class received these marks on a test: 68,82,95,82,71,47,85,87,95,56,68,95,78,81,84,73,62,70,72,57,66,74, 67,91,53,76,90,77,45,75,82, and 69.

   a. Complete the table below:

Interval	Number (frequency)
40-49	
50-49	
60-69	
70-79	
80-89	
90-99	

   b. On graph paper construct a frequency histogram based on the group data.

   c. In what interval is the median?

   d. Which interval contains the upper quartile?

2. The following are heights of 27 students in inches: 63,67,60,59, 72,65,69,64,67,71,66,70,62,69,63,67,62,60,67,69,72,66,67,66,65,66, and 68.

   a. Complete the table below:

Interval	Number (frequency)
58-61	
62-65	
66-69	
70-73	

   b. On graph paper construct a frequency histogram based on the table.

   c. What interval contains the median?

   d. What interval contains the lower quartile?

   e. Find the mean?

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Survey of Student Abilities

Part I

1.	120 + 66 + 17 =	1. _____
2.	2387 + 1070 + 594 =	2. _____
3.	1001 - 828 =	3. _____
4.	7654 - 2768 =	4. _____
5.	5704 X 9 =	5. _____
6.	924 X 204 =	6. _____
7.	751 ÷ 5 =	7. _____
8.	4067 ÷ 47	8. _____
9.	2/3 + 3 7/8 =	9. _____
10.	6 - 4 2/3 =	10. _____
11.	7/9 x 1 1/2 =	11. _____
12.	2 ÷ 1 1/4 =	12. _____
13.	85 + 46.4 + 9.677 =	13. _____
14.	69.1 - 4.567 =	14. _____
15.	.227 x .053 =	15. _____
16.	.1953 ÷ 6.3 =	16. _____
17.	-81 + 35 =	17. _____
18.	-54 - 21 =	18. _____
19.	-17 X -9 =	19. _____
20.	176 ÷ -22	20. _____
21.	-12 - 8 ÷ + 6 =	21. _____
22.	- (-6 + -8) =	22. _____
23.	-15 (9 + -4) =	23. _____
24.	-16 (-24 + 24) =	24. _____

Each problem below illustrates a property. Put the correct letter after each problem: A = Associative C = Communtative D = Distributive I = Additive Identity R = Reciprocal

25.	(3 + 4) + 5 = (4 + 3) + 5	25. _____
26.	-17 + 0 = -17	26. _____
27.	9 (2 + 6) = 18 + 54	27. _____
28.	1 4/5 X 5/9 = 1	28. _____
29.	Which number is an integer? a) 3/5 b) 9 c) d) 6.3	29. _____
30.	Which number is a prime number? a) 51 b) -5 c) 3/11 4) 37	30. _____

Survey of Student Ability
Part II

1. $6/12 = n/50$ 1. $n =$ _____

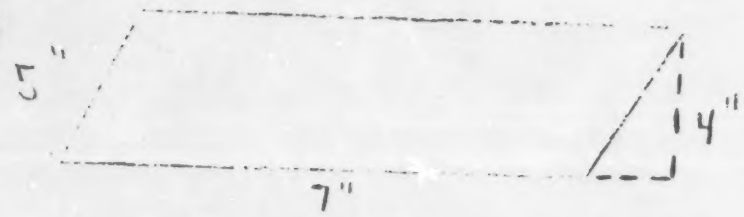
2. If 6 pencils cost 33¢, fing the cost of 4 pencils. 2. _____

3. 60% of what number is 10.8? 3. _____

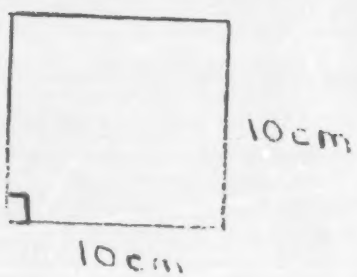
4. Golf clubs marked at $125 were discounted 20%. What was the sale price. 4. _____

5. On a test Toliver answered 38 out of 40 questions correctly. Express his score as a percent. 5. _____

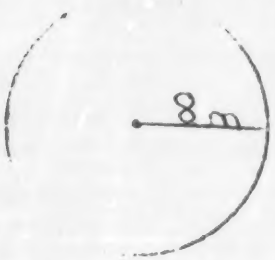
Using the dimensions in the given diagrams, find what is asked for.



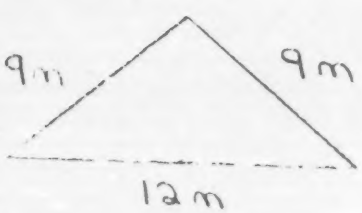
6. Area = _____



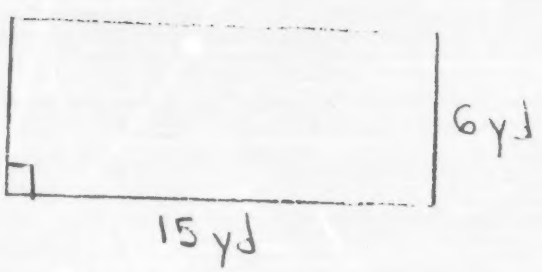
7. Perimeter = _____



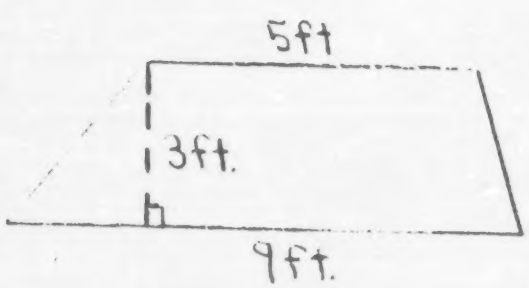
8. Circumference = _____



9. Perimeter = _____



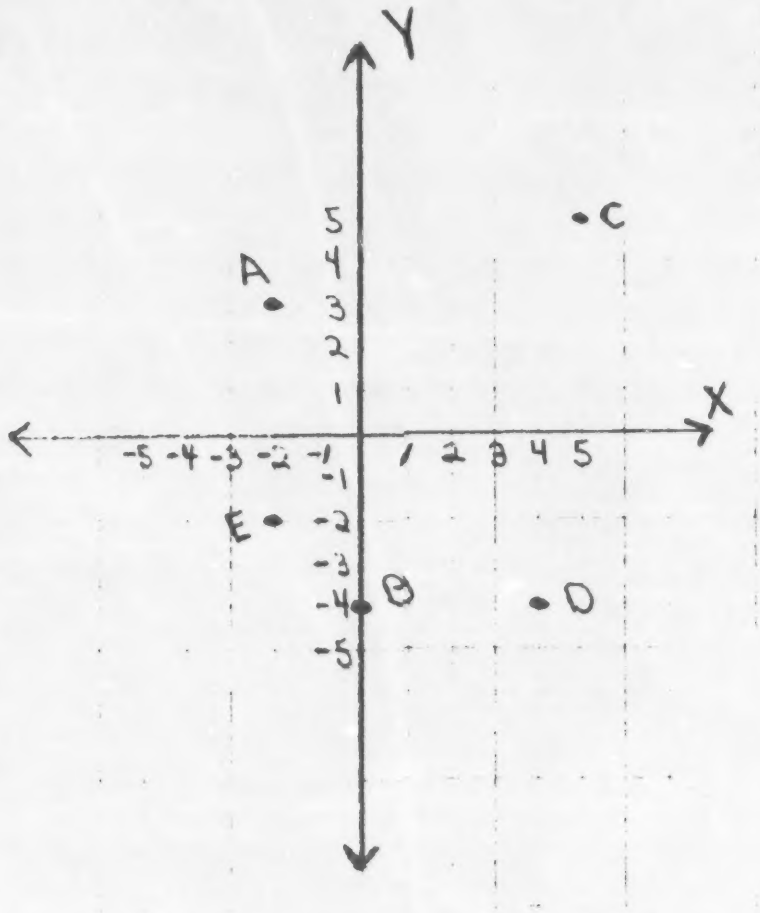
10. Perimeter = _____



11. Area = _____

Write the verbal phrase in mathematic terms.

12. 8 less than n. 12. _____
13. 30 increased by 4 times x. 13. _____
14. 3 more than twice Z is 11. 14. _____
15. L divided by 4 is 12. 15. _____



Name the ordered pair corresponding to each of the points on the graph.

16. A = _____
17. B = _____
18. C = _____
19. D = _____
20. E = _____

21. $(-2)^3$ = 21. _____
22. 10^4 = 22. _____
23. $(4X)^0$ = 23. _____
24. $X^7 \cdot X^3$ = 24. _____
25. N^{12} / N^4 = 25. _____

Solve each of the following for the vairable.

26. 2X + 9 = 26. _____
27. 7N - 2 = 12 27. _____
28. 5N/4 = 100 28. _____
29. 4 (X - 2) = 20 29. _____
30. 3Y + 2Y = -15 30. _____

Adventure I

Add, Subtract, Multiply, Divide

1.	493 + 52 =	1. _____
2.	78 + 65 + 43 =	2. _____
3.	295 + 463 + 1375 + 25 =	3. _____
4.	607 + 38 =	4. _____
5.	253 + 172 =	5. _____
6.	247 - 39 =	6. _____
7.	820 - 219 =	7. _____
8.	865 - 294 =	8. _____
9.	605 - 128 =	9. _____
10.	444 - 289 =	10. _____
11.	423 X 6 =	11. _____
12.	926 X 642 =	12. _____
13.	6450 X 30 =	13. _____
14.	604 X 28 =	14. _____
15.	674 X 25 =	15. _____
16.	829 ÷ 6 =	16. _____
17.	784 ÷ 37 =	17 _____
18.	799 ÷ 47 =	18. _____
19.	5427 ÷ 9 =	19. _____
20.	1742 ÷ 26 =	20. _____

Adventure II
Fractions

Perform the indicated operations.

1.	5/12 + 7/8 =	1. _____
2.	2 1/3 + 3/4 =	2. _____
3.	7/12 + 5/6 =	3. _____
4.	8 3/8 + 4 1/3 =	4. _____
5.	7 5/8 + 3 1/2 =	5. _____
6.	3 - 2/5 =	6. _____
7.	5/6 - 2/5 =	7. _____
8.	4 2/9 - 1 7/9 =	8. _____
9.	17 3/4 - 7 1/8 =	9. _____
10.	9 4/5 - 2 6/7 =	10. _____
11.	5/9 X 18/9 =	11. _____
12.	6 X 2/5 =	12. _____
13.	3 1/7 X 4/5 =	13. _____
14.	2 2/3 X 1 3/4 =	14. _____
15.	5 X 3 1/4 =	15. _____
16.	6/7 ÷ 13/14 =	16. _____
17.	5/6 ÷ 6 =	17. _____
18.	3 1/4 ÷ 5/8 =	18. _____
19.	9 ÷ 2 1/2 =	19. _____
20.	14 1/3 ÷ 8 3/5 =	20. _____

Adventure III

Decimals

Perform the indicated operations.

1.	17.86 + 31.07 + 29.46 =	1. _____
2.	7.932 + 6.208 + 9.61 =	2. _____
3.	7.006 + 6.6 + 8.394 =	3. _____
4.	27.86 + 13 + 14.6 =	4. _____
5.	92.3 + 8.62 + 190 =	5. _____
6.	23.04 - 17.68 =	6. _____
7.	13.93 - 6.87 =	7. _____
8.	72.006 - 36.547 =	8. _____
9.	81.99 - 27.698 =	9. _____
10.	43 - 18.62 =	10. _____
11.	.08 X 67 =	11. _____
12.	4.2 X .12 =	12. _____
13.	79.2 X .38 =	13. _____
14.	.628 X 4.2 =	14. _____
15.	.004 X .95 =	15. _____
16.	9 ÷ .6 =	16. _____
17.	9.49 ÷ 73 =	17. _____
18.	.546 ÷ 3.9 =	18. _____
19.	18.53 ÷ 1.7 =	19. _____
20.	1.937 ÷ 1.49 =	20. _____

Adventure IV
Integers

Simplify each of the following:

1.	-28 + -38 =	1. _____
2.	8 + -14 =	2. _____
3.	-12 + 37 =	3. _____
4.	15 + -15 =	4. _____
5.	-10 + 39 + -28 =	5. _____
6.	19 - 30 =	6. _____
7.	-39 - -8 =	7. _____
8.	-45 - 61 =	8. _____
9.	12 - -18 - 6 =	9. _____
10.	-46 - 16 - -18 =	10. _____
11.	-8 X 12 =	11. _____
12.	-12 X -6 =	12. _____
13.	4 X -3 X 7 =	13. _____
14.	5 X -2 X -1 X 6 =	14. _____
15.	-2 X -3 X 2 X -11 =	15. _____
16.	48 ÷ 6 =	16. _____
17.	-75 ÷ -15 =	17. _____
18.	-50 ÷ 10 =	18. _____
19.	42 ÷ -7 ÷ -3 =	19. _____
20.	-96 ÷ 8 ÷ 4 =	20. _____

Adventure V
Number Theory

Match the equations with the correct property that it illustrates:

1.	1 X 4/5 = 4/5	_____	A. Associative
2.	-4 X 28 = 28 X -4	_____	B. Multiplicative
3.	-4 (3 + 7) = -12 + -28	_____	Inverse
4.	(-7 + 3) + 6 = -7 + (3 + 6)	_____	C. Commutative
5.	+.8 + -.8 = 0	_____	D. Distributive
6.	8 + (2 + -3) = 8 + (-3 + 2)	_____	E. Multiplicative
7.	3/4 X 1 1/3 = 1	_____	Identity
8.	0 + .7 = .7	_____	F. Additive Inverse
9.	10 (7 - 3) = 70 - 30	_____	G. Additive Identity
10.	(8 X 3) X -2 = 8 X (3X - 2)	_____	

The following are sets of numbers from smallest to largest: Prime numbers (P), Natural numbers (N), Integers (I), and Rational numbers (R). For each number below list all of the sets to which it belongs.

11.	15/3	_____
12.	-8	_____
13.	0	_____
14.	$\sqrt{16}$	_____
15.	4.2	_____
16.	+12	_____

Adventure VI

Ratio and Per Cent

1.	$X/5 = 3/20$	1.	X=
2.	$19/x = 57/15$	2.	x=
3.	$12:15 = x:45$	3.	x=
4.	$90/81 = 10/3X$	4.	X=
5.	$8/2x = 15/60$	5.	x=

Change to per cent:

6.	2 out of 5	6.	
7.	65/1300	7.	
8.	27/25	8.	
9.	72:96	9.	
10.	42/60	10.	

11. If 3 apples cost 17¢, find the cost of 15 apples at the same rate. 11. _____

12. If beans are being sold at the rate of 3 cans for 55¢, how many cans can be bought for $2.20? 12. _____

13. There were 120 planes on an airfield. If 75 of the planes took off on the flight, how many planes stayed on the ground? 13. _____

14. A carpet is sold at $550. Find the cost if the profit is 40% of the cost. 14. _____

15. Mr. Duncan's salary increased from $75 per week to $90 per week. Find the % of increase in his salary. 15. _____

Adventure VII
Area and Perimeter

Fill in the missing blank or blanks - answers may be left in terms of π.

Square

	Side	Perimeter	Area
1.	6	____	____
2.	____	____	25
3.	____	40	____
4.	____	____	$9x^2$

Rectangle

	Length	Width	Perimeter	Area
5.	7	5	____	____
6.	8	____	22	____
7.	____	6	____	30
8.	2z	5z	____	____

Right Triangle

	One Leg	Other Leg	Hypotenuse	Perimeter	Area
9.	3	4	____	____	____
10.	12	____	13	____	____
11.	6	____	____	____	24

Circle

	Radius	Diameter	Circumference	Area
12.	7	____	____	____
13.	____	7	____	____
14.	____	____	____	25π
15.	____	____	9π	____

Trapizoid

	Base 1	Base 2	Height	Area
16.	3	7	8	____
17.	____	7	____	78
18.	12	68	____	120

Adventure VIII
Words to Algebraic Symbols

Write the verbal phrase in mathematical terms.

1.	4 more than n.	1. _____
2.	X diminished by 12.	2. _____
3.	X exceeded by 8.	3. _____
4.	7 less than Y.	4. _____
5.	5 more than twice C.	5. _____
6.	3 less than twice C.	6. _____
7.	8 times Z decreased by 3.	7. _____
8.	7 more than the product of 6 and W.	8 _____
9.	Twice the sum of n and 7.	9. _____
10.	Two-thirds of r.	10. _____
11.	One number is twice another. If the smaller is represented by n, represent the larger in terms of n.	11. _____
12.	Buffy has n nickles. Represent the number she has in terms of n.	12. _____
13.	Amy's age now is M years. How old will she be 5 years from now?	13. _____
14.	Bernie's weight exceeds Edith's by 75 kilograms. If Edith weight X kilograms, represent Bernie's weight is kilograms.	14. _____
15.	The length of a rectangle is Y centimeters. Represent the width of the rectangle if it is 3 centimeters less than twice the length.	15. _____

Adventure IX
Graphing

Use a sheet of graph paper and completely label each axis to positive and negative 15. Plot each given point and connect in the order given.

1.	(8,4)	1. _____
2.	(-6,4)	2. _____
3.	(-10,8)	3. _____
4.	(-14,4)	4. _____
5.	(-12,2)	5. _____
6.	(-10,4)	6. _____
7.	(-8,0)	7. _____
8.	(-8,-10)	8. _____
9.	(-6,-10)	9. _____
10.	(-6,-2)	10. _____
11.	(2,-2)	11. _____
12.	(6,-6)	12. _____
13.	(6,-10)	13. _____
14.	(8,-10)	14. _____
15.	(8,1)	15. _____
16.	(10,-1)	16. _____
17.	(10,-5)	17. _____
18.	(12,-5)	18. _____
19.	(12,0)	19. _____
20.	(8,4)	20. _____

Adventure X

Exponents

Simplify each of the following:

1.	$(-3)^3$	1. _____
2.	-1^4	2. _____
3.	$4^2 \cdot 2^1$	3. _____
4.	$X^3 \cdot X^5$	4. _____
5.	$z^{20} \div z^5$	5. _____
6.	$(X^4)^3$	6. _____
7.	$(2AB^2)^0$	7. _____
8.	$(3y^2)^2$	8. _____
9.	$(2y^3) \cdot (-5y)^2$	9. _____
10.	$(1/9)^2$	10. _____
11.	$3X^2 (4X - 5)$	11. _____
12.	$6y^5 \div 3y$	12. _____
13.	$(-3/5)^0$	13. _____
14.	$(17XYZ)^1$	14. _____
15.	$\frac{(2X)^5 \cdot X^3}{(5X)^2}$	15. _____
16.	$2 \cdot 3^2 \cdot 4$	16. _____
17.	$(1/2)^2 + (1/2)^3$	17. _____
18.	$3(X^3)^4$	18. _____
19.	$X^2 Y \cdot X^4 Y^5$	19. _____
20.	$(-3AB^3)^4 \cdot (2A^2 B)^3$	20. _____

Adventure XI

Simple Equations

Solve each of the following for the variable.

1.	$4X + 3 = 27$	1. _____
2.	$2(X + 4) = 20$	2. _____
3.	$-2/3X = 1$	3. _____
4.	$7N - N = 24$	4. _____
5.	$6X - 126 = 0$	5. _____
6.	$3X - 14 = 4$	6. _____
7.	$1/2X + 3 = 9$	7. _____
8.	$-9 = 14X + 5$	8. _____
9.	$15 + 3B = 8B$	9. _____
10.	$7(A + 5) = 21$	10. _____
11.	$3X/11 = 9$	11. _____
12.	$1/2X - 3 = 1$	12. _____
13.	$5(X - 3) = 10$	13. _____
14.	$6y + 25 + 2y = -15$	14. _____
15.	$-6Z - 18 = 0$	15. _____